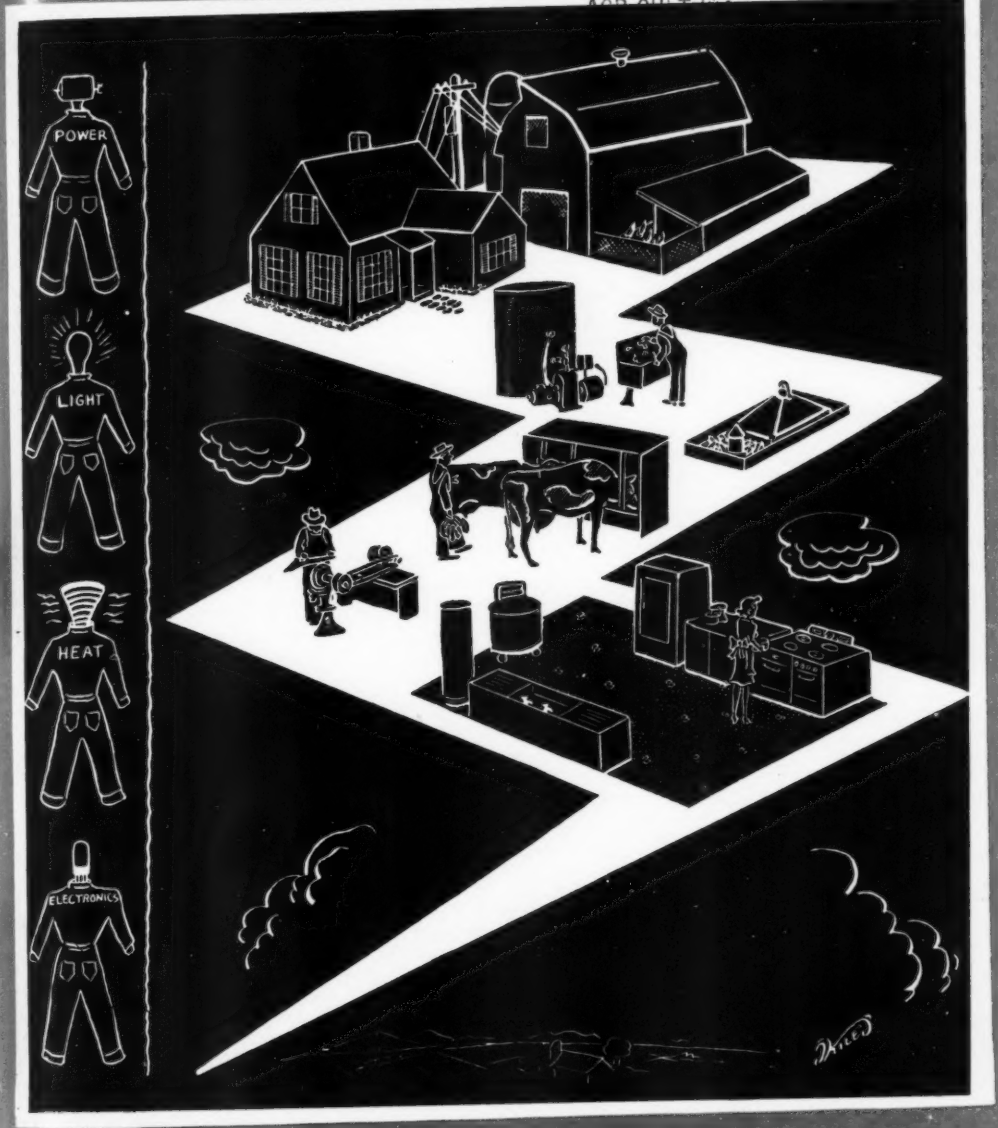
ELECTRICITY ON THE FARM *Magazine*

AUG.-SEPT., 1947

COVERALL ISSUE

20th Year . . . No. 7

VIRGINIA POLYTECHNIC INSTITUTE



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Now the new General Electric Stock Waterer solves one of your big problems: how to give your livestock a plentiful supply of fresh drinking water every day of the year . . . automatically, economically . . . ice-free even in sub-zero weather.

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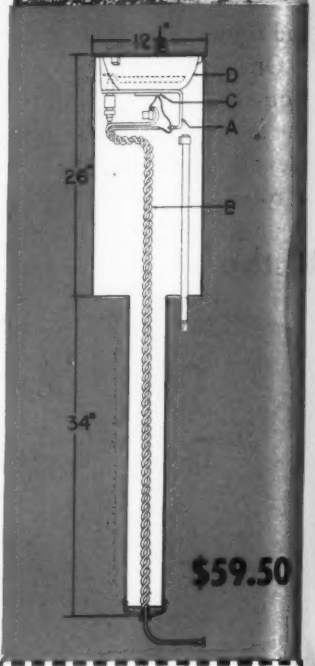

GENERAL ELECTRIC

Farm Industry Division
Section 669-50
General Electric Co.
Schenectady 5, N. Y

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IF YOU PUMP WATER BY HAND...

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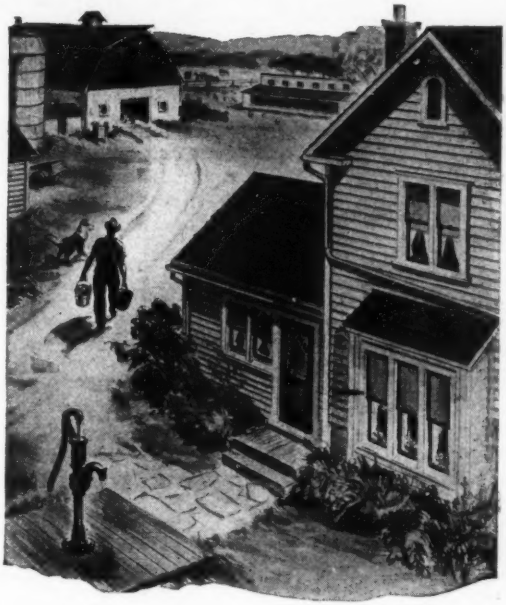
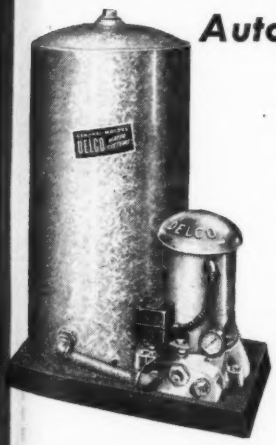


Pumping water with an old-fashioned hand pump and carrying it *any distance* is tiresome work, time-taking and unnecessary.

On one Ohio farm a time and motion study showed that members of the family actually lugged more than eleven tons of water yearly—over a route totaling forty-nine miles.

All the Water You Need—

Automatically with DELCO Water Systems



A Delco electric Water System will supply all the running water you need for livestock, kitchen, bath, laundry and garden—piped conveniently to faucets in the house, barn and other buildings.

The New DELCO-JET *Wellmaster* Water System

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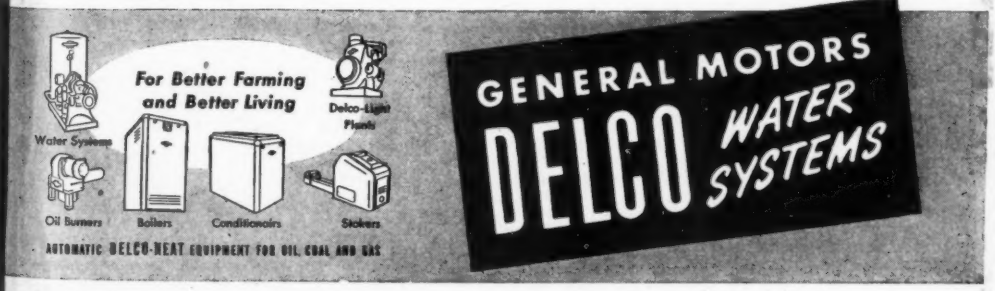
There are Delco Shallow Well, Deep Well and Delco-Jet Water Systems of many capacities and sizes. Your Delco Water System dealer will be glad to show you how you can enjoy the fullest use of running water by means of an installation "tailored" to fit your particular requirements. See him—or write for free folders. DELCO APPLIANCE DIVISION, General Motors Corporation, Rochester 1, N.Y.



Editor's Chat

COVERALL CHAT

America is a grand place! With all our fuming over political and economic matters, few of us would trade our country, our form of government, or our opportunities for any other place on the planet.

American farmers have the most and best equipment, the highest standards of living, the best record of production, the greatest hope for the future of any farmers in the World. We got that way under our free enterprise system. And if we do not like farming, we are free to do anything else we choose.

The remainder of the World, with few exceptions, is not that way.

If, in our own country, we see communists, dictators and selfish interests spreading or worming their way in, we must keep our "2-4D" and "DDT" working on the weeds and the worms. Of even greater importance is the need of cultivating and fertilizing the good things we have. Those good things must be kept growing or they will die.

BE SAFE—ALL YEAR

A "COVERALL" issue would not be complete without a word about farm safety. Farms have a lot of machinery. If you are careless or thoughtless, machinery kicks back at you. Then you have many places to fall from and on, and horses to kick you; and safe bulls that suddenly get vicious. And you have plenty of things that can catch on fire.

Yes, I want to scare you a little. You need to be scared into thinking about safety and acting safely. The farm accident and fire rate is too high. Accidents happen quickly. You'll think afterwards. That's too late.

Electricity causes very few accidents. But you cannot enjoy electricity if the bull or tractor kills you or you slide out of the mow onto a pitchfork. Electricity will help you light the dark dangerous corners and stairs. It will provide water to help fight fires, or save broken legs hurrying to the privy in the dark. Don't try to cheat by providing electric wires that are too small or putting in fuses larger than was intended. Be cautious about making "haywire" extensions to good wiring, or using frayed extension cords or multiple sockets in a single outlet. If in doubt about safety, have your wiring inspected. Treat electricity right, and it will continue to be the safest thing on your farm. And think!

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THIS ISSUE

This entire issue is a manual. Regular and special features have been omitted. In their place is brief, specific information about all of the more common uses for electricity on farms. For greater detail, unusual uses and farmer experiences, refer to your back issues of ELECTRICITY ON THE FARM and to those to follow.

All equipment prices given in descriptions are approximate only.

This manual is intended as a reminder of some of the many ways in which electricity can be used profitably. Keep it for reference when you are planning for additional equipment. It will also serve to give the rural dealer some idea of the equipment he should carry and the services he can render.

George W. Kable

ELECTRICITY ON THE FARM *Magazine*

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Look to Westinghouse

FOR YOUR FARM ELECTRICAL PRODUCT NEEDS

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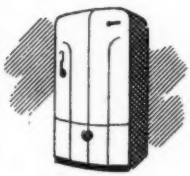
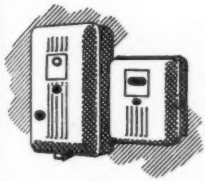
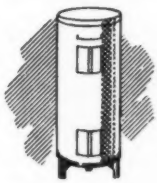

REFRIGERATORS

RANGES

FARM WELDERS


MOTOR CONTROLS

MILK COOLERS

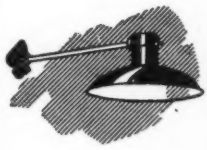

WATER HEATERS

AIR HEATERS

WIRING DEVICES

RADIOS

LAMPS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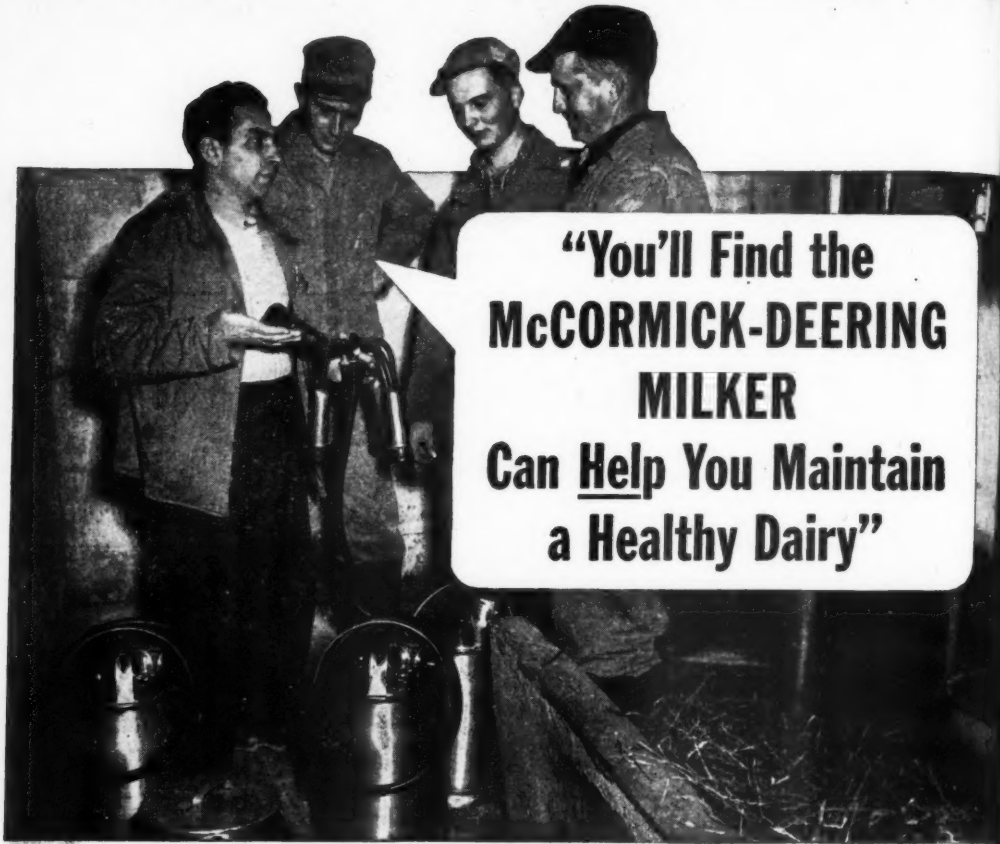
DESIGNED FOR A SAFE, THOROUGH JOB IN YOUR DAIRY



Of all the farm machinery used today, the mechanical milker is the only machine used on a live animal.

Because it works directly with dairy cows, the McCormick-Deering Milker *must* and *does* deliver satisfactory performance that not only saves time and labor, but also assures healthy udders and maximum production for the full lactation period.

Take these McCormick-Deering features of variable vacuum and the easy way in which teat cups are removed as examples of such performance:

The vacuum in the McCormick-Deering varies because it is controlled by the amount of milk flowing through the long milk hose—actually, by the cow herself. In this way, easy-milking cows receive less vacuum; for hard milkers, the vacuum increases proportionally. *Variable vacuum as applied by the McCormick-Deering is essential to healthy herds.*

Once the cow is milked out, you shut off the vacuum *at the pail,* cutting off the large quantity of vacuum in pail and stanchion hose. Then only a slight twist is needed to break the small vacuum seal and easily remove the teat cups.

But with milking machines that shut off vacuum *only* at the stall cock on the line—leaving a full pail of vacuum on the udder—a strenuous pulling of the cup assembly is required to break the heavy pressure. *This force may injure the teats and may lead to mastitis.*

Of course, these are only two reasons why the McCormick-Deering is nationally known for safe and satisfying work. Your International Harvester Dealer will be glad to demonstrate and point out the many other features.

INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue Chicago 1, Illinois

The Place and Function of Electricity

ELECTRICITY is the *chore power* of the farm. It is also the *processing power* for farm crops. It is that *something which lessens the drudgery* of the farm home and makes the farm a happier place to live. It makes the farm more attractive to young people, and the city less attractive to older people.

Read the banner heading at the top of this page. It says much. Electricity will do things no other source of power will do. It provides light, it cools the refrigerator, it heats the oven and the chick-brooder, it operates the food mixer, the milking machine, the hay finisher, it gives us music through the radio, and it kills germs or produces healthful rays of ultra-violet. All these operations are started without effort by means of switches. Automatic controls regulate the temperature of your refrigerator or incubator, the pressure of your water system, the volume of your radio.

Electricity is not a luxury. If used intelligently it pays its way many times over and leaves a profit. It can save much labor carrying water, milking cows, cleaning stables, avoiding coal and ashes in cooking. It improves products and makes money by cooling milk, sterilizing utensils, increasing winter egg production, cleaning and cooling the eggs, by growing plants in hot-beds and holding crops in cold storage.

"Used intelligently" is important. Electricity can be a hazard to life and property, if used carelessly, just as gasoline or coal can be. The electric brooder or electric range must be operated very differently from the fuel burning brooder or wood range. Such differences must be learned to get the best results with electricity. Electricity can be carried on wires into places where other sources of power and heat cannot be taken. But unless carried on wires large enough in size, it can also overheat the wires and set fires. These things should be understood by users of electricity. Electricity is the safest and most versatile form of energy available to the farm *if used intelligently.*

"GO ALL ELECTRIC!" is a slogan you will hear more of in months to come. What does it mean? It means there is competition for your business between bottled gas, oil, gas and electric industries. If you use small quantities of each of these services, you will usually pay the highest rates for each. When you buy many kilowatt-hours of electricity per month, the rate per kilowatt-hour is much lower. If you use electricity for some things, it will pay you to investigate carefully its use for cooking, water heating, refrigeration, pumping, etc. The reduced rates of "all electric" service may bring a cash saving and greater safety and pleasure in its use.

Facts on the Use of Electricity

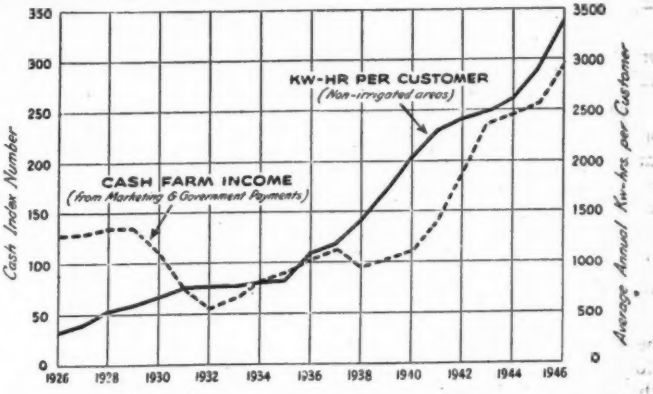
Farms Having Electric Service

	U S Total	*Per Cent*
Total farms in US (1945 Census)	5,859,169	
Farms having service Jan. 1, 1947	3,335,700	57
Farms within ¼ mile of power lines but not using service	789,300	13.5
Total farms to which power line service is available	4,125,000	70.5
Per cent of farms with service available that are not using it		19.0
Farms not reached by power lines	1,734,169	29.5

The job of extending electric lines to American farms is 70.5 per cent completed. Power companies and the REA have applications from farmers which will largely wipe out the other 29.5 per cent. Lines are being built as fast as materials and labor will permit. The majority of the unserved farms are in states where the type of agriculture or the tenant system has kept down the farm income.

The 19 per cent of farms with service available that are not using it are scattered over the United States. They are operated by farmers who may be mobile tenants, or who have not learned that electricity can pay its own way and make a profit, or who look upon electricity as a luxury which their incomes will not support.

Farm Use and Cash Income



The main thing to be pointed out in the accompanying chart is the increase in the number of kilowatt-hours used per farm. There was no drop even during the depression. When a farmer learns how to use electricity, he uses it. He increases his use. This curve should be kept in mind when planning wiring installations. The average cost per kilowatt-hour decreased gradually all during this

period when the use went up. It is about the only thing that farmers buy that has gone down in price year after year.

There have been too many factors which affected farm income during 1926 to 1946 to draw conclusions on the effect of electricity on income. One fact, however, is evident. After 1936, when farmers were really commencing to use electricity, the kilowatt-hour consumption went up first and the farm income followed it.

One Wisconsin electric company where the farm consumption now averages 4700 kw-hrs per year estimates that by 1960 the average will be 11,000 kw-hrs per farm per year. That is only at the present rate of increase.

Kinds of Rural Service

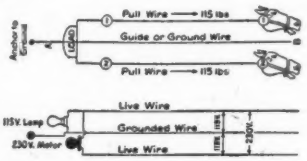
FARMS in the United States are now supplied with one of three different kinds of service.

1. Single phase, 2 wire at 115 to 120 volts "pressure".

2. Single phase, 3 wire at 115-230 volts to 120-240 volts "pressure".

3. Three phase, 4 wire at 120-208 volts "pressure".

Most large generators have three sets of windings. They generate three circuits (phases) of electricity at the same time. All three circuits are carried out along the highways on *transmission lines.* Those lines must have three wires, sometimes four. Three phase service is used for heavy motor loads in factories or industrial plants. For residential or farm use it is customary to run only two of the three wires out as a *distribution line.* Those two wires supply single phase current. Around 97 per cent of farms in this country have only single phase service. On the West Coast and in Arizona where many motors of more than 10 horsepower are used for pumping irrigation water or dehydrating prunes or hops, three-phase service is supplied.



The upper sketch indicates two horses pulling a load. If each horse pulls 115 pounds and is attached to the load by a pull wire, the two horses pulling together will move a 230 pound load. Now suppose you use only one horse hitched to one side of the load. You would need a guide wire anchored to the ground at A to guide the load from A to B. The one horse would pull a load of only 115 pounds.

The lower sketch shows similar electric "pulling wires". With both "live wires" hitched to the load you would pull at 230 volts without the center grounded wire. With only one "live wire" pulling you would need a grounded "guide" wire and you would pull only 115 volts. When pulling at 230 volts you would need only the two live wires. When pulling at 115 volts you can use either live wire with the grounded wire. If you have several loads, some of which need 230 volts and some 115 volts, you would use all three wires. That is single phase, 3 wire service. Three wires run from the transformer to your service entrance.

Electric ranges, water heaters, dairy utensil sterilizers, welders, and all motors over one-half horsepower call for 230 volt service.

All farm service should be 3-wire, 115-230 volts. Residences where electricity will never be used for more than lights, a radio and a few small appliances may get by with 2-wire, 115 volt service.

Wiring

Wires are the paths for electricity. If you live in a cabin in the woods you may have little to transport. A foot path (or a small wire) may serve your needs. As you clear land and expand your operations you will have machinery to move in and crops to move out. You will need a wagon road (larger wires). But if you are farming as a business and have much hauling to do or you need to get to town fast in a truck or car, you will need a wide, well constructed highway for heavy loads. And you will need good driveways about the farmstead. It's the same with wiring. If you are going to use electricity in your business, you will need well constructed lines with large wires to carry heavy loads. And you will need wire lanes all over the farmstead to get the electricity where you want it. There is no way to fool electricity. You cannot drive a motor through a small, poorly constructed line any better than you can drive a tractor up a narrow

mountain trail. If you try it, your motor will not pull as it should and you will lose your electricity along the wire. Remember that. It will save you money and trouble.

(The flow of electricity in wires may also be compared to the flow of water in pipes. Suppose you have a 500 gallon pressure tank with water in it under 40 pounds pressure. A ½ in. pipe runs from the tank one-half mile to a garden. There is 40 pounds pressure in that pipe—until you turn on the sprinkler in the garden. It dribbles but will not sprinkle. There is still 40 pounds pressure in the tank, but you have lost the pressure in the long, small pipe. Replace it with a 2 in. pipe and you can sprinkle. You lose electricity the same way in a wire. Replace it with larger wire and the electricity will flow again under pressure.)

Remember also that chart on p. 7, showing how farmers increase their use of electricity. You will too. Put in big enough wires to take care of your needs for a few years ahead.

A fuse is a gate in the road. The gate must be small enough so that any load that will pass through it can be carried down the road (wire) safely. If you knock out the gateposts (or put in over-size fuses) you are likely to ruin your road and wreck your wagon.

COST OF ELECTRICITY LOST *through* INADEQUATE WIRING

WIRE SIZE A.W.G.	DISTANCE FT.	ELECTRICAL LOAD-AMPERES												
		6	10	15	20	25	30	35	40	50	60	70	80	90
#14	50	$0.10	$0.26	$0.60										
	100	0.19	0.52	1.20										
	200	0.38	1.04	2.40										
	300	0.57	1.56	3.60										
#12	50	0.06	0.16	0.36	$0.64									
	100	0.12	0.32	0.72	1.28									
	200	0.24	0.64	1.44	2.56									
	300	0.36	0.96	2.16	3.84									
#10	50	0.04	0.10	0.22	0.40	$0.62								
	100	0.08	0.20	0.45	0.80	1.24								
	200	0.16	0.40	0.90	1.60	2.48								
	300	0.24	0.60	1.35	2.40	3.72								
#8	50	0.03	0.06	0.15	0.25	0.40	$0.60	$0.77						
	100	0.05	0.12	0.30	0.50	0.80	1.20	1.54						
	200	0.09	0.24	0.60	1.00	1.60	2.40	3.08						
	300	0.14	0.36	0.90	1.50	2.40	3.60	4.62						
#6	50	0.02	0.04	0.09	0.16	0.25	0.36	0.49	$0.64	$1.00				
	100	0.03	0.08	0.18	0.32	0.50	0.72	0.98	1.28	2.00				
	200	0.06	0.16	0.36	0.64	1.00	1.44	1.96	2.56	4.00				
	300	0.09	0.24	0.54	0.96	1.50	2.94	2.94	3.84	6.00				
#4	50	0.01	0.03	0.06	0.08	0.15	0.22	0.32	0.40	0.62	$0.90	$1.22		
	100	0.02	0.05	0.12	0.16	0.30	0.44	0.64	0.80	1.24	1.80	2.44		
	200	0.04	0.10	0.24	0.32	0.60	0.88	1.28	1.60	2.48	3.60	4.88		
	300	0.05	0.15	0.36	0.48	0.90	1.32	1.92	2.40	3.72	5.40	7.32		
#2	50		0.02	0.04	0.06	0.10	0.13	0.18	0.24	0.40	0.60	0.77	$1.00	$1.26
	100	0.01	0.03	0.07	0.12	0.20	0.25	0.36	0.48	0.80	1.20	1.54	2.00	2.52
	200	0.02	0.06	0.14	0.24	0.40	0.50	0.72	0.96	1.60	2.40	3.08	4.00	5.04
	300	0.04	0.10	0.21	0.36	0.60	0.75	1.08	1.44	2.40	3.60	4.62	6.00	7.56

Beyond the allowable current carrying capacity of rubber insulated wire

TABLE IS BASED ON 500 HOURS USE OF LOAD; ELECTRICITY AT 2¢ PER KW-HR; 1940 NATIONAL ELECTRICAL CODE. J.B.Stere

Electric wiring is paid for in two ways. First, you pay for it when it is put in. If the wires are large enough, that first cost is the whole cost. But if you try to squeeze a lot of electricity through a small wire, you will keep on paying every time electricity flows through those wires. If the wires are too small, electricity is wasted in heating them. You pay for that heat instead of using the electricity to run your motors or light your lamps.

The table above gives the cost of electricity lost in wires that are too small. It is figured for 500 hours time at 2c per kw-hr. The heavy faced figures in the table mean that heaters, motors, etc., will not operate properly on that size wire. The "length of run" is the distance (one way) from the point where the wire you are considering starts, to the place where the electricity is used. If the amperes used are not stated on the equipment nameplate, divide the watts used by the voltage of the circuit. Example: An 1150 watt heater plus a 575 watt motor equals 1725 watts on the line. Divide 1725 by 115 volts in the circuit and you have 15 amperes. If your electricity costs more than 2c per kw-hr. your loss will increase proportionately.

Your 15 ampere load would operate on a 50 ft run of No. 14 wire with a loss of 60c in 500 hours. If the line was 100 ft long, you would need No. 12 wire to keep the loss down to 72c.

There is some loss in all wires. The larger the wire and the shorter the run, the smaller will be the loss.

"Business farms" where electricity will be used in the dairy, for a large poultry operation, for mow hay curing or a farm welder, should have 3-wire service with a 100 ampere entrance or larger.

"The National Electrical Code", which is revised every few years, gives regulations for safe wiring to prevent fires. It is technical, for wiremen. Available from National Board of Fire Underwriters, 222 W. Adams St., Chicago 6, Ill. 10c.

The "Handbook on Farmstead Wiring Design" tells how to plan farm wiring. 55 pages, 40c. Industry Committee on Wiring Design, Rm. 2650, 420 Lexington Ave., New York 17, N. Y.

Westinghouse, General Electric, several state agricultural colleges, and a number of power suppliers have good bulletins on farm wiring. If you are planning new wiring or additions to your wiring, consult your power supplier. He can tell you of any local regulations, where to get information, wiring supplies, or where to hire a contractor.

Electricity in the Dairy

Milkers

Milkers are of two types: portable and pipe-line. Portable units cost less. They are especially adapted to small herds and for tenants who may move. Pipe-line units have the pump, motor and piping permanently installed.

There are two kinds of portable units. On one, the motor and pump are on a cart that can be wheeled and plugged into outlets behind the cows. The milker units are similar to pipe-line units. The other kind has the pump, motor and pulsator on top of the pail.

Pipe-line units are also of two types. In one, the milk is drawn into the milker pails, while in the other the milk passes from the cow into a receiver, then through a pipe directly into the milk house.

Costs vary from around $150 for small portable milkers to as much as $2500 for elaborate receiver types. Pipeline pumps use motors of ½ to 3 hp; portable milkers ¼ or ½ hp.

On how small a herd can you afford to use a machine? These figures from California farms may be of interest.

Size Herd	Using Milking Machines
Up to 10 cows	5 per cent
11 to 25 cows	30 per cent
26 to 50 cows	70 per cent
51 to 75 cows	82 per cent
76 and over	100 per cent

Advantages of milkers are saving of labor, substitution for labor that is not available, ability to handle more cows, cleaner milk.

Some farmers have discontinued using milkers. Usually it has been because the milker was not used right. Proper preparation of the cow is essential. Fast milking—3 to 4 minutes per cow—should always be practiced. It saves time and cuts down udder troubles. Cleanliness and sanitation in washing and sterilizing equipment is necessary. It is not burdensome if done right and regularly.

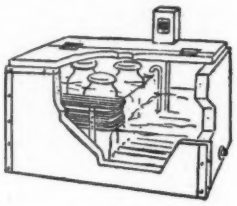
Power used in milking averages 2 kw-hrs per cow per month.

In case of a power outage some farmers have belted the vacuum pump to the farm tractor through a hole in the barn wall; other farmers in Ohio are reported to have connected the intake manifold of the tractor to the pipe line to provide a vacuum.

Milk Coolers

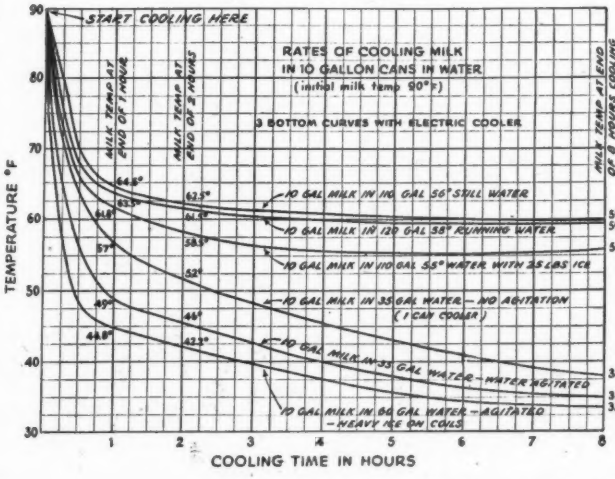
Milk is cooled electrically (1) by immersing cans in mechanically refrigerated water or calcium chloride brine or (2) by pumping refrigerated water or brine through a surface cooler or passing a refrigerant like freon directly through the coils of a surface cooler. Milk cooled over a surface cooler is marketed at once or stored in a dry refrigerator. Milk to be bottled is usually cooled over a surface cooler. Milk sold in cans is cooled in a wet cooler.

Wet coolers are made in sizes from 1 to 8 cans and larger. Compressors range from ¼ to 1 hp.



Power used is about 1 kw-hr per 10 gallon can.

The purpose of the electrical cooler is to lower the temperature of the milk to 50° or below within 2 hours to keep down the growth of bacteria. Coolers with agitators cool faster than those without. Electric cooling is faster, and much cheaper than cooling with ice water where ice must be purchased. It also eliminates the labor and mess of ice handling. It is, of course, much faster than cooling with well or spring water.


START COOLING HERE
RATES OF COOLING MILK IN 10 GALLON CANS IN WATER
(initial milk temp 90°F)
3 BOTTOM CURVES WITH ELECTRIC COOLER
MILK TEMP AT END OF 1 HOUR
MILK TEMP AT END OF 2 HOURS
MILK TEMP AT END OF 8 HOURS COOLING
10 GAL MILK IN 10 GAL 56° STILL WATER
10 GAL MILK IN 120 GAL 58° RUNNING WATER
10 GAL MILK IN 110 GAL 55° WATER WITH 25 LBS ICE
10 GAL MILK IN 35 GAL WATER — NO AGITATION (1 CAN COOLER)
10 GAL MILK IN 35 GAL WATER — WATER AGITATED
10 GAL MILK IN 60 GAL WATER — AGITATED — HEAVY ICE ON COILS
TEMPERATURE °F
COOLING TIME IN HOURS

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● "It's so bright and sparkling, I just can't help showing it off to our friends. A Crane Bathroom is such a joy to own . . . why, we never knew till now what real convenience is!

"And that's not all. John got me a new Crane Kitchen, too . . . and Crane laundry tubs! Really, it just seems like my work is cut right in half.

"The way it started, John called at the Crane Dealer's in town to see about running water for the stock. He got the water, all right, and then, when he saw how little it costs to have all the comforts that water brings . . . well, here they are!"

Better talk it over with *your* Crane Dealer next time you're in town. See how easy it is to have the best in comfort and convenience for your farm.

A complete CRANE water system includes
PLUMBING FIXTURES, PIPING, PUMP.

Plumbing for Bathrooms, Kitchen—laundry

Pumps for Shallow or Deep Wells

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Utensil Sterilizers

Some city health departments and some state health departments require the sterilization of milk utensils. Whether required or not, sterilization improves milk quality by cutting down on bacteria introduced.

Fifteen years ago there were a number of types of electric utensil sterilizers. Now there are two that predominate.

In the East the **controlled steam sterilizer** is most common. It consists of a front opening metal cabinet with racks for the utensils. In the bottom are metal enclosed electric heaters. Utensils are put in the cabinet wet from the rinse water. The door is closed and electricity turned on. The heat evaporates the water and fills the cabinet with steam. The electricity is cut off automatically. The sterilizers are made in 4 to 9 can sizes using from 1 to 5 kw. Power consumption is 3 to 4 kw-hrs per 100 lbs of utensils sterilized.

On the West Coast, steam cabinets are used. Steam is supplied by electric **steam accumulators.** These accumulators are similar to large heavily insulated water heaters. They have low wattage heating elements that superheat the tank of water to about 260° F and 20 pounds pressure. The 1 to 3 kw heating elements are of such size that the tank is heated and the current cuts off about an hour before milking time. When the sterilizer valve is opened, the superheated water flashes into steam, filling the cabinet. A mixing valve is also provided to mix superheated with cold water for utensil washing.

Heat in the Milk House

Milk houses that are occupied for a number of hours each day may be heated with steam or with electric space or convection heaters. They require time for heating the room.

For the small milk-house that is used for only short periods twice a day, portable radiant or fan type heaters may be used. A radiant heater will start heating the object it is pointed at as soon as it is turned on. Radiant heaters with metal reflectors and with 660 or 1000 watt heating elements are excellent. They are durable and inexpensive. They can be pointed at the spots where you work. They plug into convenience outlets.

Single 250 watt heat lamps over wash trays have been effective hand warmers. They should be hard glass lamps or should be placed where water will not splash on them.

Separators

Most cream separators today are available with electric motor drive. They include both table and floor models. Motors of ¼ hp turn them. If not equipped with motor when sold, most of the separators are made so that a motor drive may be added. It involves extending a high speed shaft through the housing to which a drive pulley may be attached. Separators without this provision may also be converted to motor drive if pulleys are adjusted so the drive belt will slip until the separator comes up to speed.

Electric drive does better separating. Separating efficiency depends on correct and uniform speed. The electric motor has this.

Milk Pasteurizers

Four companies are now manufacturing small electric milk pasteurizers for home use. They hold from 1 to 2 gallons of milk and sell for $40 to $70. Three pasteurize in bulk; one in quart jars. They plug into 115 volt convenience outlets. Temperature controls are automatic.

For the small dairy producing 10 to 20 gallons of milk per day, there are no electric pasteurizers available. Manufacturers are doing experimental work on them. One was available before the war.

Standard batch pasteurizers of 40 gallon size or larger use either hot water or steam for pasteurizing. Either can be produced electrically in large storage water heaters or steam accumulators. Some such installations have been made.

Churns

Several types of electric churns are on the market. Barrel churns may be converted easily to motor drive with either a commercial or a home-made speed reduction device. The barrel should turn at 50 to 60 rpm.

Motorized churns made commercially are of the barrel type, plunger type and dasher type. Several companies make motors of 1/10 hp with long shafts carrying paddles that extend down into a milk can or jar. They are inexpensive and are becoming quite popular.

Ventilation of Dairy Stables

Electric ventilation accomplishes several things. 1. It saves barn timbers and siding from decay. 2. It provides a drier, more healthful atmosphere for the cows and helps maintain milk production. 3. It produces much better working conditions for the men. 4. It saves paint, piping, and wiring. 5. It eliminates drafts.

Fans of 1/20 to ¼ hp draw air out of the stable from a point or points near the floor. Fan capacity should be 60 cu ft per minute per 1,000 lb cow or six changes of air per hour in the stable. Intakes are provided around the stable to deliver air upward against the ceiling without draft. Intakes should be about 60 sq in. in cross-section, with one for each four cows. Fans can run continuously throughout the winter or be controlled by thermostats and speed reducers in exceptionally cold weather. Results in cold climates have been excellent. System can be installed when barn is full of hay. Installation costs from $30 up; average from $3 per cow for medium herds. Power consumption about 2 kw-hrs per cow per month.

Barn Cleaners

Five companies now build barn cleaners of several types. Electric motors drag the manure out of the gutters into the spreader. Enough have been installed to prove their practicability. Installation costs range from $700 upward. Total power required for cleaner and elevator from ¾ to 4 hp. Power consumed is of the order of ½ kw-hr per day. Operates only 10 to 15 min per day. Many homemade barn cleaners have been installed throughout the country. Operation is similar to commercial cleaners which were patterned after them.

Ensilage Cutters and Blowers

Ensilage cutters with 14 in. throats are being operated with motors as small as 3 hp. Many silos are filled with 5 hp motors. Conditions must be right for successful use of 5 hp or smaller motors. Do not run the cutter any faster than necessary to blow in the silage. Most of the power is taken by the blower; not the cutter. Sharpen cutter knives once or twice

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A G-E FARM WELDER

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● With a General Electric Farm Welder in his workshop, the modern farmer becomes increasingly independent when it comes to quick or emergency repairs; he can make them himself, practically "on-the-spot"—and usually do a better, permanent job, without loss of valuable time.

But repairs are not the only thing for which a G-E Farm Welder is useful. With one you can build your own equipment, or modify standard equipment to suit your own requirements, just to mention a couple of outstanding uses.

And it's important to remember that the G-E Farm Welder is designed and built especially for operation on rural power lines—to provide adequate, dependable welding service without interfering with other electric equipment. It conforms to both NEMA and REA requirements.

Stop by your G-E distributor or dealer next time you're in town and inspect a Farm Welder. You'll like the compact design, and the price—as low as $152. *General Electric Company, Schenectady 5, N. Y.*

GENERAL ELECTRIC

672-85

a day. Set knives as close to shear plate as possible without striking it. Use 4 in. flexible belt. Have delivery pipe straight up and down. Feed uniformly.

Unless you have other uses for the motor or must use the tractor for other work, it will seldom pay to have a 7½ or 10 hp motor and the necessary wire and transformer for silo filling.

Blowers for elevating chopped hay and silage may be operated with 5 hp motors if properly speeded. Elevators or conveyors use much less power than blowers for the same tonnage handled.

Silo Unloader

One company builds silo unloaders. More than 100 have been installed. The mechanism is supported above the ensilage by three cables and is lowered daily by the depth of silage to be taken out. A rotating collector arm scrapes the ensilage to the center where it is picked up by a small blower and delivered into the silo chute. It will deliver frozen silage. Driven by a 3 hp motor. Operated from barn floor, except for trip, into silo about once in ten days to lower delivery pipe. The dispenser may be moved from silo to silo as emptied.

Other Dairy Applications

Root Cutters. Beet and turnip shredders and slicers are electrically operated on many dairy farms. Power required from 2 to 5 hp.

Bull Prods. Rods 3 to 5 ft long containing dry batteries and coils to give a biting electric discharge as a bull persuader. Cost $5 to $10.

Heating Pads. Wet or dry pads for applying heat and medication to inflamed udders, strained muscles, etc.

Milk Bottlers are standard equipment in most market milk dairies. The larger sizes fill continuously and are electrically operated.

Bottle Washers. Double brushed driven by ¾ hp motors for washing inside and outside of bottles.

See also: General Farm Uses, Refrigeration, Water, Light.

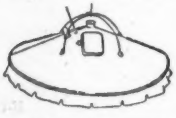
Electricity on the Poultry Farm

Incubators

Practically all large incubators have electric heat controls and air circulation. Most of the small and medium sized incubators are heated electrically. Electric incubators are available in sizes of 50 eggs and up. The advantages of automatic operation and uniform heat and moisture control are so obvious as to need no comment.

Brooders

More research work has been done on electric brooders than on most any other piece of farm electric equipment. Dozens of kinds, styles and sizes of electric brooders, and heaters and fans for making brooders, are available. Good chicks are being brooded with all of them. The important thing is to *learn how to use* the particular brooder you buy or make. Chicks must be handled with an entirely different technique from chicks in fuel burning brooders. The best testimonial for electric brooders is the large number of them that are being purchased or made and used.



The chief advantages of electric brooding are care-free operation, automatic controls, less fire hazard, better feathering, economy.

The brooder should provide at least 7 sq in per chick; 10 sq in is better. Brooder insulation is important. From 1½ to 2 watts per chick should be provided in heaters.

Wet litter is the greatest complaint against electric brooding. It can be best overcome by having tight, warm, double constructed floors without floor drafts, by good house ventilation and the use of deep litter.

Most brooders have the heat supplied to the chicks from above. At least one underheat brooder has been on the market and many have been built by poultrymen. In some, soil heating cable has been used on the floor with radiant heat above.

Heat lamps hanging above the chicks without hovers have been tried experimentally. The cost has been higher and results not good enough to establish the method.

Outdoor hovers with screened floor or grass runs have been used successfully in the South and West.

Battery brooders with one unit above the other are used largely for raising broilers and for starting chicks. They have not been popular as farm brooders.

Debeakers

These small electric devices costing about $15 to $23 are used to cut about ⅜ in. off the upper mandible of a chicken. The debeaker cauterizes the wound as it cuts. There is little bleeding and the wound heals quickly. The purpose of debeaking is to stop cannibalism. It also helps prevent waste of mash from hoppers. The same device is used for clipping wings of chicks.

Lights for Egg Production

Lights are used for stimulating winter egg production of commercial flocks, for bringing pullets into laying faster and for the regulation of production of hatching eggs when wanted. Lights are also used to stimulate growth of chicks.

It is now generally accepted that lights produce a direct stimulation and not just a longer feeding day.

In lighting turkeys for early egg production, the toms should be lighted several weeks before the hens.

Standard poultry house lighting installations consist of 40 watt lamps in RLM or flat dome reflectors spaced 10 ft. apart, 6 ft. high and half way between the front of the house and front edge of dropping boards. The total hours of light should be 13 to 14. If the lights are used in the morning, no dimmers are necessary. If used in the evening, some method of dimming the birds onto the roosts is necessary. **Electric time switches** are available for controlling the lights. Some poultrymen use 15 or 25 watt lamps and keep them on all night. Sudden stoppage of lights may throw hens into a moult.

Ultra-Violet

The Nebraska Experiment Station has found that Sunlamps of

save more labor

use HUDSON electrical farm equipment

Rid cows of flies and other pests with the *automatic* Hudson Rival LEKTRIK-SPRAY Dairy Barn Sprayer. You plug it in — it does the job — much faster and much, much easier than ever before.

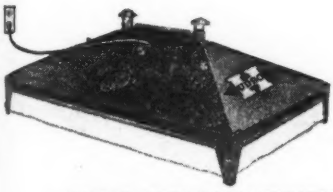
This winter, save many more hours of work and daily drudgery by buying the Hudson LEKTRIK-HEET Stock Tank Heater. Keep ice out of stock tanks *automatically!*

This fall and next spring let Hudson LEKTRIK-HEN Brooders raise stronger, healthier chicks with much less work and time—they work *automatically.*

Hudson electrical farm equipment is the result of years of extensive "testing and proving." It is built to help you take full advantage of electricity, to save more labor. Buy Hudson Tested and Proved Equipment at your Hudson dealer now.

HUDSON LEKTRIK-HEET* TANK HEATER

One of the finest, most practical pieces of equipment ever developed for the farm. Keeps water at desired temperature all winter long automatically without any attention. Consumes electricity only when needed. Easy to install, completely safe. Tested and proved on farms in coldest climates. Fits all tanks. Connecting lock-in socket FREE.

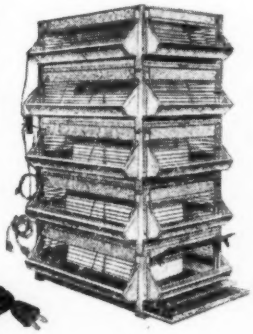


HUDSON LEKTRIK-HEN* BROODER

Health-giving, tested and proved radiant heat develops vigorous, fast growing chicks. All you do is set the thermostat – the LEKTRIK-HEN does the rest. No work, no worry. Controlled humidity helps keep litter dry. Uniform heat distribution prevents huddling.

HUDSON RIVAL LEKTRIK-SPRAY*

One of the greatest labor-savers ever offered busy farmers. Discharges 3 quarts of fly-spray or other liquid insecticide at the flick of a switch. Saves so much time, takes so little work you'll spray oftener, better—and have a better-producing herd. Available with time switch.



HUDSON LEKTRIK-HEN* BATTERY BROODER

Uses the same tested and proved radiant heat, blended air principle as the famous LEKTRIK-HEN floor brooder. Provides the right balance between heated and open area. Gives all chicks, even the weakest, an even chance. Easy to clean, easy to operate – in every way the finest battery brooder ever offered.

*T. M. REG. U. S. PAT. OFF.

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HAY TOOLS AND BARN EQUIPMENT
LIVESTOCK EQUIPMENT
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the S-1 or S-4 type will take the place of cod-liver oil in providing vitamin D, and in improving the hatchability of eggs.

Sunlamps should be placed not more than 6 ft. from the floor, and preferably over the feed hoppers or water pans. Four hours exposure per day is sufficient. Use one lamp per 100-150 birds.

Bactericidal lamps (Germicidal or Sterilamps) have proved themselves to be effective in killing germs in the air and on surfaces receiving the rays. They do not take the place of Sunlamps. They do aid in farm sanitation. (See Ultra-Violet page 42.)

Egg Cleaners

Electric egg cleaners are motor driven abrasives which remove dirty spots from shells without wetting the egg. Several types are available. Most of them are attachable to the shaft of a ¼ or ⅓ hp motor. Some use sand-paper abrasive, one a buffer with cleaning compound. Cost under $10.

Egg Graders

These motor driven machines separate eggs into different grades by weight. Several types are made. Some machines have built-in candlers.

Egg Coolers

Egg coolers may be either electrically cooled refrigerators or evaporative coolers with an air blast. The purpose of cooling eggs in the summer time is to remove the animal heat quickly and hold the egg at a temperature of around 55° until marketed to avoid deterioration. It is best not to cool the eggs much below 55° or they will sweat when removed.

Evaporative coolers are especially satisfactory in dry, hot climates. They have been used satisfactorily to step up the grade of eggs 2c to 3c per dozen in New Jersey and Pennsylvania. The eggs are placed in galvanized pails having open screen bottoms. The pails fit closely into holes in the top of a tight box. The air is cooled by drawing it through an excelsior pad at one end kept moistened by dripping water. The fan which is placed inside the box draws the air through the excelsior pad and forces it up through the egg pails.

Fans directed on eggs in wire baskets in cool cellars will help to remove the animal heat quickly.

Caponizer

Electric caponizers remove the testicle and cauterize the wound at the same time. Preferred by many.

Scalders

Electric scalders hold the temperature of water constant at a semi-scald point (128°-130°) for dressing poultry. It consists of an insulated container of galvanized iron, copper or stainless steel with a heating element of 1000 to 3000 watts and a thermostatic control. They insure uniform scalding without injury to or discoloration of the skin.

Waxers

Waxers are used in the final cleaning of picked ducks, turkeys, etc. A special wax is used. It is liquified in a container surrounded by an electrically heated water bath. Picked fowls are immersed in the wax then dipped in cold water. The wax solidifies. When cracked off, the pinfeathers, and hair, come with it. The wax is heated in a remelter, strained and reused. Waxers are similar to scalders but with an inner container.

Poultry Pickers

Poultry pickers have flexible rubber fingers about 4 in. long set in the outside of a motor driven drum. The smallest size has 28 picking fingers and is driven by a ⅓ hp motor. Standard size models have 170 to 315 fingers on drums that rotate at 250 to 450 rpm, driven by ½ to 1 hp motors. Chickens are picked at the rate of 40 to 200 per hour. Feathers are rubbed off. The machines sell for $100 to $500. Power consumption is ½ to 1 kw-hr per hundred birds picked. Electric pickers are almost universally used now in poultry dressing plants.

"Even if you didn't think his daddy's new electric poultry picker would work, you should have kept your big mouth shut!"

Dressing Plants

Complete electrically operated dressing plants are available. They have continuous chain conveyors on which the fowl is hooked. It is first electrocuted to release the feathers, then bled, scalded for a predetermined time, carried over the picking table, then "plumped" in cold water.

Poultry House Elevators

In the East where three and four story poultry houses are common, elevators for moving feed, litter and eggs up and down are becoming increasingly popular. Standard small electric freight elevators may be used. A number of poultrymen are using electric chain hoists. The hoist, complete with motor, brakes and control is hung in the top of the building. Timbers are erected as guides for the elevator cage. They are usually tapered 2 x 4's. If cage has side pieces made of channel irons, they can be fitted over the 2 x 4 guides. The elevator is hooked to the hoisting chain. Two weighted control ropes hang from the hoist. Pull one to raise, the other to lower. The hoists are made to lift 250 to 2000 pounds with ¼ and 1 hp motors. They hoist at 11 to 34 ft per minute. Cost from about $150 to $275.

Single-drum farm hoists have been rigged up to operate elevators. With them a spring controlled stop at each floor provides a safety device and a levelling arrangement.

Where safety codes are in force, operators are not permitted to ride on such elevators.

You'll say we made it just for Farm Kitchens

This NEW FRIGIDAIRE COLD-WALL

BIG Super-Freezer Chest

Holds up to 35 pounds of frozen food . . . a whole week's supply right in your kitchen . . . cuts down on trips to town. Wonderful for frozen desserts. Quickube Trays give you plenty of ice cubes, fast.

Lots of Room Here, Too!

Chilling coils inside cabinet walls. That's why air stays still and moist, why foods stay fresh days longer... uncovered. Aluminum shelves adjust 16 ways — permit you to store 3-gal. cream can and 15 doz. eggs.

Meter-Miser Makes the Cold

Sealed in steel, oiled for life...it's the simplest refrigerating mechanism ever built. Compressor has two simple parts that move. The Meter-Miser uses less current than an ordinary light bulb.

You're twice as sure with two great names

Frigidaire *made only by* **General Motors**

Meet the New Frigidaire Home Freezer

This model holds 280 pounds of frozen food . . . a grocery store right on your farm! When you put away your garden vegetables, meats, pies, and cakes in this freezer, you know they'll be *safe*. Why? Because Frigidaire has made more low-temperature refrigerated cabinets than any other manufacturer in the world!

Frigidaire *made only by* **General Motors**

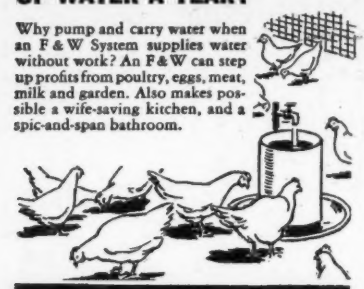
Listen to "The Man Called X" every Thursday. See newspaper for time, station.

See your Frigidaire Dealer about Frigidaire Refrigerators, Home Freezers, Electric Ranges, Water Heaters, Kitchen Cabinets, Automatic Home Laundry Equipment, Milk Coolers.

Frigidaire Division, General Motors Corporation, Dayton 1, Ohio. In Canada, Leaside 12, Ontario.

100 HENS NEED 1460 GALLONS OF WATER A YEAR!

Why pump and carry water when an F & W System supplies water without work? An F & W can step up profits from poultry, eggs, meat, milk and garden. Also makes possible a wife-saving kitchen, and a spic-and-span bathroom.



F&W
FARM PROVED
WATER SYSTEMS

F & W Centrifugal jet systems for shallow, medium, and deep wells.

F & W Plunger Type Systems for shallow, medium, and deep wells.

Thousands of Farmers Say
F&W RUNNING WATER IS
DEPENDABLE

Before you buy any water system, talk to farmers who own an F&W. Thousands say their F&W is the most dependable equipment on the farm, working day and night to supply water for production and comfort. Trouble-free running water is an F&W advantage farmers appreciate.

F&W makes water systems for wells of any depth—in sizes for all needs—in centrifugal and plunger-type models. See your F&W dealer or write direct to

FLINT & WALLING MFG. CO., INC.
895 OAK ST., KENDALLVILLE, IND.

Litter and Feed Conveyors

Drag-chain grain and baled hay elevators and rubber belt conveyors have been used by some poultrymen in conveying litter from houses into wagons; also for handling baled litter and sacks of feed. Several manufacturers are now interested in developing a light weight fractional horsepower conveyor for this purpose that can be handled by one or two men.

Dropping Board Cleaners

Dropping board cleaners of the scraper type operated by a ¼ hp motor have been used. They have been assembled on the farm.

Green Feed and Litter Cutters

Where green alfalfa, kale, rape or grains are fed to birds in confinement there is less waste where the green stuff is chopped. Small hand choppers may be motorized to do this job and to chop straw for chick litter. Use motors of to 1 hp.

Ventilation of Poultry Houses

The same principles apply as i dairy barn ventilation. Fans shoul have a capacity of 1½ to 2 cu per min for each bird house Fans of 6 to 9 in. diam power by 1/40 to 1/20 hp motors a commonly used. Be sure the f you buy will move the right qua tity of air. The operating cost very low. When properly install with intakes well placed, they he in keeping the house dry and swe and save litter. Air should be di charged from near the floor an intakes directed toward the ceilin to prevent drafts. Warm floors an deep litter should go with ventila tion.

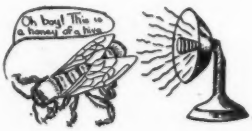
Feed Grinders, Corn Shellers and Crackers and Feed Mixers, Cob Crushers, Alarms

See General Farm Uses. See also Water Pumping and Heating.

Electricity in Bee Culture

Hive Heaters

Hive heaters are new. They consist of a low wattage heating element (under 100 watts) and a heat control to be placed in the hive.



They are used for wintering bees in cold climates and for producing and protecting strong early brood for building strong colonies. Similar in principle to brooding chicks.

Uncapping Knives

These electrically heated knives are used for removing caps from honey to be extracted. Experimental work has also been done on motor-driven mechanical uncappers.

Honey Extractors

Motor driven centrifugal extractors are standard equipment. They use motors of ¼ to ½ hp.

Honey Heater and Bottler

A homemade device consisting of a 50 gal drum in an electrically heated water bath. The outer water tank is insulated and provided with a 5 kw immersion heater. Honey is thinned, strained, and bottled through a faucet.

Honey Liquifier

An electrically heated, insulated plywood oven with galvanized iron lining. Temperature held at 140° to 160°. Sugared honey in containers up to 5 gal. size is liquified overnight. Holds 300 pounds. Has 1200 watt heater.

Electric steam boilers are also used for liquifying and cleaning.

Electricity in Fruit and Vegetable Production

Hotbeds

Heating hotbeds was one of the early productive uses for electricity. Special cable made of insulated heating wire covered with a lead sheath heats the soil. The cable is used in 60 ft lengths. It generates about 400 watts of heat on a 115 volt circuit. On 230 volt circuits, 120 ft produces 800 watts. Sixty feet of cable is commonly used to heat 36 sq ft of bed. The temperature is controlled by a soil thermostat. The cable may be placed either on the soil surface or six inches beneath the surface. Sixty feet of cable costs about $5; thermostats $6 to $15. Power consumption averages about 1 kw-hr per sash (3′ x 6′) per day. Advantages are better control of temperature than with manure, automatic protection on especially cold nights, adjustment of temperature for the particular plants being raised. Lengths shorter than 60 ft on 115v or 120 ft on 230v should not be used. Shortening the cable increases its temperature and may damage the insulation.

A plastic insulated heating cable without the lead sheath is also available. It costs less; has been found durable; has different wattage ratings.

The Connecticut Agricultural Experiment Station developed the use of lamp heated hotbeds. The lamps are supported above the bed with reflectors to direct the heat downward. While the heat from the lamps is satisfactory, the lamp supporting strips are in the way when working in the bed.

Soil heating cable laid on the ground surface or attached to the sides of a coldframe is good insurance against frost. A thermostat will turn on the heat on frosty nights.

Cutting Benches; Germinating Benches

Soil heating cable placed on the bottom of benches provides warm soil and cool air which has been found advantageous in inducing root growth in starting cuttings. Similar benches are used for producing seedling plants in greenhouses.

Greenhouse Heating

On the West Coast, electric heat in greenhouses has been used for many years. Experimental work was done with heaters placed under the benches. Plant houses and small greenhouses are now heated with a combination of soil heating cable in benches and unit electric heaters (fan type) for tempering the air above the benches.

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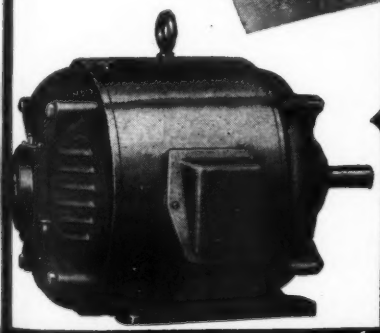

With the help of a Century motor many farm jobs such as feed grinding, forage cutting, corn shelling and tool sharpening can be turned into one-man jobs instead of requiring two or three men. Also, water pumping can be made automatic.

Century single phase electric motors are all-around farm motors that can take a lot of the back-breaking work out of farm chores. They can be furnished to start the heaviest loads, yet the starting current used is low. Whether for long continuous service or occasional jobs, Century farm motors furnish dependable power.

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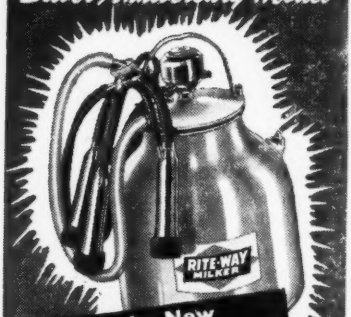

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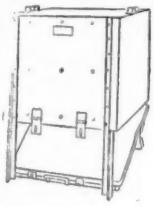
Two designs of sterilizers are available. One is a box holding ½ cu yd of soil and having metal heating elements distributed through the center of the box. It is filled from the top and dumped through a drop door in the bottom.



The other sterilizer is a flat box holding about ¼ cu yd and being divided into sections by vertical metal plates. Current is passed between these plates and the resistance of the soil causes it to heat. It is filled and emptied as above.

The wattage of sterilizers is usually about 3 kw per half cu yd. Power consumption is about 1 to 1½ kw-hrs per cu ft of soil sterilized.

Stationary Spray Plants

Stationary spray pumps and tanks are usually located at some central point where water is available. The pump is set on a concrete foundation and the spray solutions carried to the orchard in permanent underground pipes.

Advantages: Can spray in ⅛ to ½ the time and when soil is too wet for spray rig. Cover crops and trees not injured. Low operating costs. Adaptable to hilly country. Disadvantages: High first cost. Extra spray material required to fill pipe lines. Hard work dragging long spray hose.

Installations range from 3 to 30 hp. A 5 hp pump will supply two nozzles (8 to 14 gpm) at pressures up to 600 lbs. Used in many commercial orchards and groves, particularly in the West.

Fruit Washers

The Government prescribes limits of the amount of arsenic and lead which may be permitted to remain on sprayed fruit. Usually this means washing the fruit to remove the spray residue. Washers use electrically heated solutions and mechanical agitation or brushing of the fruit. The fruit is then dried by means of motor driven wipers and fans. The operation may take 5 to 10 kw in heaters and up to several horsepower in motors.

Fruit and Potato Graders

Motor driven graders are standard equipment wherever apples or potatoes are marketed by grade or size. They are operated by fractional horsepower motors. The grading is done either according to weight or diameter. Usually graders are combined with conveyors and washers or other cleaning equipment.

Dehydrators

Dehydrators are common farm equipment where certain crops are grown. Most of the prune crop of the Pacific Coast is dehydrated.

Fruit and vegetable dehydrators usually consist of tunnels 20 to 40 ft long, 4 to 6 ft high and 3 to 4 ft wide. The prunes or other products are pretreated and placed on shallow, screen-bottom trays on slides or low trucks, on which they are moved through the tunnels. Air at about 165° is blown through and between the trays by large electric fans. Wood or other fuel is used for heating the air.

Conveyors, washers, elevators and water systems are part of the equipment of most dehydrators. The connected electrical load may vary from 10 to 40 hp. A farm or community dehydrator will cost from $10,000 to $30,000.

During World War II many community dehydrators were built in the South. Milk, eggs and vegetables were dehydrated in large quantities for army and navy use. The boys did not like the products too well. There were also some 20 manufacturers who undertook to build small electrically operated dehydrators for home use. No piece of home equipment ever came in and went out so fast. So far as we know they are not being manufactured at present.

Hop driers have been the subject of much experimental work in the Northwest. Many natural-draft driers have been changed to forced air types. Generally, hops are dried on "floors". These floors are made of slats about 1 in. wide on edge with 1 in. spaces between. They are covered with coarse burlap. The floor is 8 ft up from the ground in a building 30 ft square and with a hot air furnace beneath

the floor. The hops are spread very carefully to a depth of 30 in. over the floor. The walls and roof above the "floor" are sealed and the warm air is drawn up through the hops by an exhaust fan in a cupola at the top and center.

English walnut dehydrators may be of the bin or tunnel type. The principles involved are similar to those of prune and hop dehydrators.

Frost Prevention

California citrus producers have installed some air propellers as substitutes for smudge pots for frost prevention. Large motor-driven propellers are mounted on towers 40 to 50 ft high. They are driven by motors as large as 50 hp. The coldest air is closest to the ground. The propellers draw the warmer air from layers just above the trees and mix it with the cooler air. Where a degree or so will protect, these wind producers are said to handle as much as 30 acres each.

Infra-red rays have been used experimentally in California and Michigan for frost protection. They can be made effective, but so far the cost has been prohibitive.

Light Traps for Insect Control

Many insects are attracted by lights. Research work has been conducted by a number of agricultural experiment stations and by growers to determine the kind of lights and kind of electric traps which would bring harmful insects under control. Work with corn borers is being continued by the USDA. To date, results have not warranted the use of the method in orchards or fields. For tomatoes and in gardens, clear glass incandescent lamps have given good results in attracting many insects. The lamps are supported about 6 in. above a broad, shallow pan of water on which there is a film of coal oil.

Cold Storage

See Refrigeration

Conveyors

See General Farm Uses

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General Farm Uses for Electricity

Feed Grinders

Much feed—grain, ear corn, snapped corn and roughage—is ground on farms. Some of the advantages are that it costs less, it saves hauling, it frequently takes less labor, the feed is fresher, it entails no waiting at the mill or for the grinder.

In using electric motors for grinding, one must decide whether to use large grinders and motors and grind, say once a week, or small grinders and motors and grind more often. Power suppliers sometimes make a motor service charge based on the horsepower of the motor. This is a disadvantage for the large grinder unless you have pretty steady use for the motor. Motors up to 5 hp are permitted on many lines without a service charge. Few farmers can afford the time to stand and shovel grain into a small grinder. The answer is, if one wishes to enjoy the labor saving and other advantages of electric power, he must be willing to learn the ways of electricity. A one horsepower electric grinder will grind feed for 50 cows, and do it every day while you do other chores. It takes some planning and constructing of overhead bins and spouts to feed the mill to have it grind automatically. Whenever a farmer has made the change, he has been happy. Head work instead of back work.

Hammer mills are the most popular type. They handle anything from straw to limestone. They are available in sizes of 1, 2, 3, and 5 hp and up. They will crack corn or grind to flour. They are high speed machines (1800 to 5000 rpm) adapted to motor drive. The striking of the hammers always produces a certain amount of fine material in the grinding. Most of the mills have blowers which elevate the ground material through a cyclone to overhead bins. Some of the blowers may be used for elevating without grinding. It is possible to grind several grains together for a mixed feed. Some hammer mills have chopping devices to aid grinding of ear-corn and snapped corn.

Burr mills have been proved by long use. By changing and adjusting burrs one can crack corn or grind very fine. They are available in sizes from ¼ hp up. The cost is less than for hammer mills. They may be adapted to semi-automatic grinding, but are more subject to clogging. Several high speed burr mills have been developed especially for automatic electric grinding. Many are in use and doing an excellent job. One *combination mill* chops roughage and feeds it through the burrs with grain to be ground as a mixed feed.

Roller mills have not been popular in this country although some feeders prefer rolled to ground grain. There is less dust in the feed. In Canada, these mills are increasing. They are very durable. They are available in small sizes for electric drive.

Cereal cutters that cut shelled corn, grain or beans without crushing them have just been announced. Capacity 300 lbs per hour with ½ hp motor. Continuous feed.

Power used for feed grinding averages about 1 kw-hr per hundred pounds.

Feed Mixers

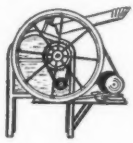
Vertical, screw-conveyor type mixers are the most common. They are made in capacities of 250, 700, 1000, 2000, 3000 and 4000 pounds and are operated by motors of ½ to 7½ hp. Costs range upward from about $80. Medium and large sizes are fed from a bottom hopper. Mixes in 10 to 15 minutes.

Small, homemade mixers have been built from rectangular wood boxes, or from 50 gallon oil drums with shafts placed diagonally through the heads. They should turn slowly—5 to 20 rpm.

Home mixing of feeds has the advantages of using home grown feeds, always getting the same mix, and having freshly mixed feeds.

Corn Shellers

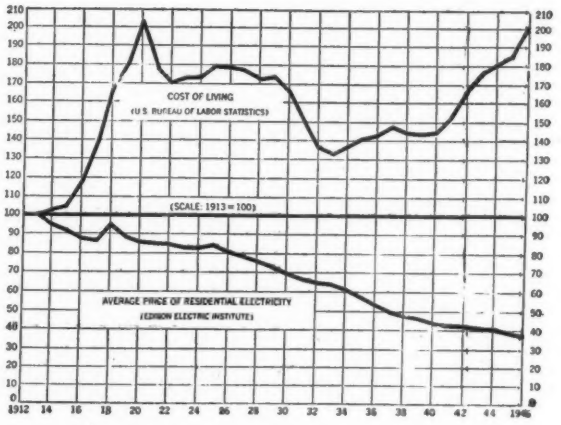
Corn shellers for electric drive are of three kinds: 1. The ordinary one and two hole hand shellers of the plate type. 2. Cylinder shellers. 3. Corn and cob crushers.



Some plate shellers are made for electric drive. Practically any of them may be easily equipped with a motor drive. If the fly-wheel has a smooth flat face, the sheller may be driven with a V belt, using a V pulley on the motor. If the flywheel, has a round face, a flat or V rim or a bicycle rim may be bolted to the spokes of the flywheel. Tie a white rag on the rim of the flywheel, then turn the sheller by hand at the speed where it will shell best. Count the number of times the wheel goes around in a minute. Select your motor pulley so the sheller will run at that speed.

Single hole shellers can be run with ¼ to ½ hp motors; 2-hole shellers with ½ to 1 hp. Higher speeds increase the power requirements. The power used per 100 pounds of shelled corn ranges from about 0.04 to 0.14 kw-hr.

Cylinder shellers require 3 to 5



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hp and handle up to 250 bu per hr. A 2 hp cylinder sheller was made some 8 years ago but is no longer available. The cylinder sheller is fed from a hopper and is subject to semi-automatic operation. It costs around $75.

Corn and Cob Crusher

An ear corn crusher designed especially for electric drive was placed on the market two years ago. It will handle husked or snapped corn. It has a large conical shaped hopper that holds about a bushel but can be fed from an overhead bin for continuous automatic operation. The crusher has a capacity of about 400 pounds per hour and is driven by a 1 hp motor. The corn is completely shelled from the cob and the cob crushed to pieces about the size of kernels of corn. Very little of the corn is cracked. A separator which may be attached to the machine separates into shelled corn, crushed cobs and husks. The machine may be used for shelling and making a cob or husk litter; or it may feed directly into a 1 hp hammer mill for making corn and cob meal. The two machines may be operated together without constant attention.

Ensilage Cutters
Ensilage Elevators

See "Electricity in the Dairy"

Hay Driers

During the past 25 years there have been many developments in the quick drying of hay. It has been partially an electrical development since electricity was used to chop the hay, operate the air blowers, the oil burners, the rotating drums or the long conveyors. Two general types of driers survived the experimental periods.

The tunnel driers are metal and masonry structures up to 200 ft. long through which a uniform mattress of green hay is carried on a conveyor. Air at 240° to 300° F. is blown across, beneath and through the hay. The hay comes out at the far end ready to chop or grind.

Rotating drum driers may be single drums or multiple drums, one inside of the other. The outer drum of a multiple drum drier may be 7 ft in diameter and 20 ft long, the middle drum 5 ft and the inner drum 3 ft in diameter. Chopped green hay is fed into the inner cylinder. It passes through its length, then into and through the middle cylinder, then through the outer cylinder and into a collector. An air blast along with the hot gases from an oil burner mix with and carry the hay through the drier. The temperature of the incoming gases is 1200° to 2000° F. The hay passes through the drier in a few minutes.

Hay driers handle fresh-cut and wet hay. They save all the leaves and produce a beautiful green hay with fine aroma and high in digestible nutrients and vitamin A. The cost of the driers ranges from $5,000 to $15,000 or more. Capacities are 1 to 3 tons per hour. Drying costs have been estimated at $4 to $10 per ton.

Hay Finishers

The hay finisher should not be confused with hay driers. The finisher takes hay from which as much moisture as possible (preferably down to 35 or 40 per cent) has been removed in a partial day's curing in the field. The curing is finished in the haymow or in a special structure. The curing is done by blowing air through the hay by means of a system of air ducts. The air may be slightly heated or unheated. A finishing system may cost from $50 up, with an average of probably $400. The trend has been to greatly simplify the air distribution system in mows. The simplest system at present consists of one main air duct down the center of the mow over which the hay is stacked. The hay may be either long, chopped or baled. Hay chopped into 4 to 6 inch lengths or loosely baled seems to be gaining in favor. Motor driven blowers of 3 to 7½ hp supply the air.

"Hay Finisher"

Mow finishing has stimulated entirely new methods of handling hay from field to mow. They include motor driven choppers, blowers and elevators developed largely on farms.

Circular metal haymakers, similar to large silos with perforated walls and a center vertical slatted air duct are becoming popular. Air passes outward through the hay or is drawn in through it. The air can circulate naturally, but blowers are generally used for quicker finishing and better quality.

The "All Crop Drier" is a portable heating and blowing device which supplies warm air for drying different farm crops. It is made in 5 and 7½ hp sizes with capacities of 13,000 to 22,000 cfm

at 1½ to ⅜ inch static pressure. The oil burner will raise the temperature of 16,000 cfm of air 100° F. The air can be blown into a mow, crib, bin or through ducts on a specially equipped hay wagon for drying before unloading.

Hay Hoists

Hay hoists for electric operation are available from a number of companies in single and double drum types. In some, a second drum may be added to a single drum hoist. The second drum is smaller and faster and used for pulling back the fork. Costs range from $75 up. Power needed, from 1 to 5 hp.

Our recommendation has always been not to invest in a hay hoist unless you are willing to rig it up so it will save man-labor and horse-labor or tractors at haying time. That means that the hoist should be operated by the man on the load by means of ropes. We prefer a single-drum hoist with weighted pullback.

Chopped hay may be handled with rope or snow-fence slings; baled hay with slings or loose-tined grapple forks; long hay with slings or forks. A hoist permits using track and carrier equipment available in many barns.

Hay Blowers

Chopped hay blowers are now available from a number of manufacturers. They take hay dumped from a wagon, convey it to the blower and blow it into the mow. Power required 5 to 30 hp.

Three Eastern companies are this year making long hay blowers. They have capacities of 2 to 6 tons of long dry hay per hr or 10 to 20 tons of chopped hay and require 10 to 20 hp for successful operation.

Wagon Unloaders

A number of farmers have built grain and corn unloaders in wagons. A tight wagon bed has the bottom sloped toward the center from the sides. In the center is a belt or drag conveyor operated by a ¼ hp motor. The conveyor is covered with short boards fitted over it before the wagon is loaded. The boards are removed one at a time as the load is taken off. Motor is plugged-in at crib or granary.

Two types of hay wagon unloaders are being used. One has

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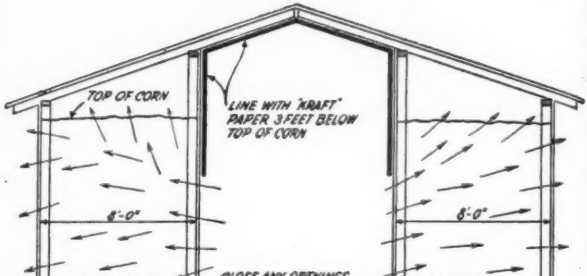
a sliding front end-gate which is pulled by a cable and crank or ratchet device to push the load out of the rear of the wagon at the rate of about 16 in. per minute. The other is a canvas apron over the bottom of the wagon which is rolled on a roller at the rear to pull off the load. It moves at about 24 in. per minute. Both devices require a gear or speed reduction mechanism of about 800 to 1. They are powered by ⅓ or ½ hp motors.

Corn and Grain Drying

Corn has been dried successfully with forced ventilation in Oregon prune driers of the tray type, in slatted bottom bins and in cribs equipped with slatted air ducts. The drying was done in cribs in the Middle West without supplemental heat during October and in the spring months. It was satisfactory when the temperature was 60° or above and the relative humidity 65% or below. One Ohio installation used a ½ hp blower producing 4000 cfm at ½ in. static pressure for 1000 bu of corn. It cost $5.62 for power. The air was blown through a square slatted duct placed down the center of the crib floor. Some Illinois installations used "A" frame ducts made of snow fence.

If periods of warm, dry weather are not available for drying in the fall, two procedures are possible: One is to use some supplemental heat in drying. This is surest. The other is to dry the corn during the first warm days in the spring. It will keep with high moisture during cold weather.

Grain drying is usually done at elevators. Some farm driers are being worked on experimentally. Grain and grain sorghums have been dried successfully in burlap bags placed over the lateral ducts of hay finishers. Other laterals should be blocked off so as to force as much air through the grain as possible.



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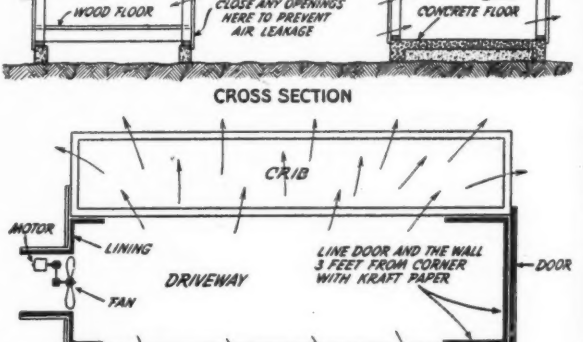

PLAN

1947 promises to be another soft corn year. This inexpensive layout gives the best recommendation to date for drying corn in cribs by blowing air through it. If heat is used, the heater should be placed outside the crib so the fan will pull the heated air from it.

Threshing Machines

Ordinarily threshing machines are not electrically operated. They require from 15 to 30 hp. A few threshers equipped with several independent motors have given good satisfaction by eliminating belts and giving better speed control. One thresher is built in the South especially for use on small farms. It is mounted on a two-wheel trailer to be pulled behind a car, and is driven by a 5 hp motor.

Farm Elevators and Conveyors

Elevators and conveyors are used on farms for elevating grain, ear corn, baled hay and straw, en-

silage, potatoes, sacked feed, turning mushroom compost, loading barrels, dumping wagons, digging cellars and cleaning barns and poultry houses.

Cup type elevators in granaries are easy to install and require little power. Equipment of all sizes and types is available.

For Platform Elevators and Litter Conveyors see Poultry Farm Uses.

Until the last few years, drag type elevators for grain, ear corn and hay have been large, heavy machines for tractor or engine operation. More recently farmers have been building their own elevators. They have found that drag type elevators as narrow as 6 in. with sloping top boards and equipped with motors of ¼ to ½ hp will handle ear corn and baled hay satisfactorily and fast enough. These elevators are lighter and easier to handle. Some are handled manually, some are mounted on two- or four-wheel trucks. Several manufacturers are now building them.

Grain Treaters and Cleaners

Treatment of grain with dust for smut is a small motor job. Treaters are available commercially; small concrete mixers are sometimes used; many treaters are made by farmers. A 50 gallon metal oil drum with a 1 in. pipe shaft placed diagonally through the heads makes a good treater. Half of one head is cut out and replaced by a door. The drum is filled with the door up and emptied with the door down.

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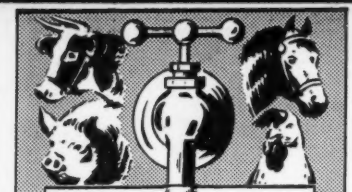

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Most grain farms have fanning mills. Some come equipped with electric motors. All can be equipped. Motors of ¼ to ½ hp will do the job. One can either replace the crank on the mill with a large pulley, or better, belt the motor to one of the higher speed shafts in the mill.

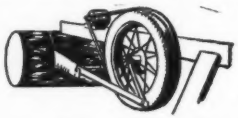
Concrete Mixers

Concrete mixers used on farms are usually of the 3 cu ft (1 sack) size made for hand or belt operation. These mixers can be driven very satisfactorily by ¼ hp motors. They should either be provided with 28 or 30 in. pulleys with a 2 in. pulley on the motor, or should have a jack shaft for speed reduction. Cover the motor with sheet-iron to keep dirt and concrete off from it.

Wood Saws

Contrary to what might be expected, cord-wood and limbs may be sawed satisfactorily with 2 or 3 hp motors and a 30 in. saw. The rate of feeding must be regulated to the power of the motor. The electric motor has much better "pull" through knots than a gas engine. The proper tooth speed for a wood saw is 7,000 ft per min. That means 1100 rpm for a 24 in. saw, 1000 rpm for 26 in., 890 rpm for 30 in., and 830 rpm for 32 in. It is important to provide pulleys of correct sizes when changing from gas engine to motor drive.

Homemade cross-cut or drag saws have been built by many



farmers. They are driven by ¼ to ½ hp motors and will handle logs up to 30 in. in diameter. Construction is relatively simple.

Wood Splitter

There are no commercial wood splitters on the market to our knowledge but several have been made by farmers. One method has been to remove the cylinder head from an old 15 to 30 hp (heavy), gas engine and fasten a steel wedge for splitting to the head of the piston. The engine is driven by motor of about 1 hp. Or a splitter may be made from the crank and crosshead of a heavy piece of machinery. The crankshaft should be about 2½ in. in diameter to avoid springing.

Shears and Clippers

For speed, good fleeces and few cuts, electric sheep shears have established themselves in a top place. There are two types. One has the motor in the handpiece of the shearer. Different heads make it adaptable to shearing or to clipping cows, etc. The other type is a heavy duty shears driven through a shaft by a ¼ hp motor. It is generally used by professional sheep shearers.

Pig Brooders

Pig brooders are inexpensive, but highly profitable equipment for saving early pigs. Purdue University found they had 30 percent more pigs at weaning time by using electric brooders. The brooder is essentially an electric lamp of 150 to 300 watts used as a heater. Reflector lamps are good, or RLM dome reflectors may be used with incandescent lamps. Usually a corner is boarded off in the farrowing pen to keep the sow out, and a roof placed over the corner at a height of about 16 in. A hole is made in this roof for the lamp to throw its heat down on the pigs. A screen over the hole prevents litter from touching the hot lamp. Some farmers just use the lamp without the hover. The heat dries the pigs and keeps them warm while they are young.

Lamb Brooders

Lamb brooders are similar to pig brooders. Usually they are small heated pens where the lamb can be dried off and warmed up after it is dropped. They are used only to give the lamb a start.

Electric Fence

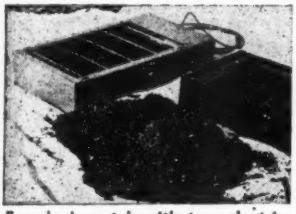
Electric fence is one of the most widely used items of electric equipment on the farm. It consists of one or two wires, usually barbed, that carry a current of high voltage and high frequency but very low amperage. The circuit completed between the wire and ground by an animal creates a sharp sting without physical injury. After a few shocks, animals avoid the wires. The special current used is produced by a "fence controller".

When properly designed and built, these controllers produce current that is safe but effective. Current to the controller is supplied either from the lighting circuit or from storage or dry cell batteries. The controllers for batteries and high line current are not interchangeable, but both may be contained in a double purpose unit. Homemade electric fences are extremely dangerous. They should never be experimented with or used. Controllers approved by the Wisconsin Industrial Commission or National Board of Fire Underwriters are considered safe.

Electric fences save time and labor and permit rotation of temporary pastures, the cleaning up of ditch banks, confining the cantankerous bull, hogging down corn, and save on cost of fence construction.

Fly Traps and Screens

Electric fly traps are usually in box form about 12" x 20" x 4" deep with an electrified grid over the top. Sour milk or just dead flies in the trap attract others. The



Two day's catch with two electric fly traps.

high voltage, low amperage current on the grids electrocutes or burns the flies. Similar grids are placed over panels in window or door screens. Traps cost $15 to $20. They kill millions of flies around kitchen doors or stables. Current consumption is very small.

Fly Sprayers

Small motor-driven fly sprayers for Flit or DDT are available from several manufacturers. They provide a spray or fog very effectively for kitchens, stables and wherever flies, mosquitoes and other insects are troublesome. They plug into any convenience outlet.

Alarms

Electric alarms are used to warn of prowlers, of fire, of failure of the electric current, of high or low

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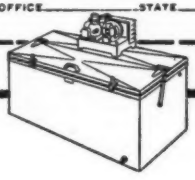

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temperatures in storage rooms or freezers or in incubators or brooders. For temperature or pressure alarms a bell rings whenever a thermostat or pressure switch circuit is closed. Similarly a power failure rings a bell operated by a battery.

Burglar alarms are of two types, open circuit and closed circuit. The open circuit type depends upon the prowler closing small switches placed strategically. The closed circuit type will alarm whenever small wires are broken or the power cut off. Closed circuit units are more tamper-proof.

Recently, central alarm systems for the farm have been placed on the market. An indicator at a central point will tell what is wrong and where. For instance, if hay in the mow is too hot, if the freezer current is off, or there is fire in the garage.

Communication Systems

Loud-speaker telephone systems for use over the farm are available for operation on 110v ac current. They provide one or more master stations for sending and receiving messages and any number of receiving loud speakers.

Lawn Mowers

Electric lawn mowers of several types have been appearing since the War ended. Most popular seems to be the whirling horizontal blade which cuts something like a scythe. There is also a mower that works like a field mower, and the common reel type mower. Most of the mowers are supplied with 115v current from convenience outlets. One is operated by a storage battery which may be recharged from the house current. The placing of a ¼ hp motor on a common hand mower is not too difficult a task for a reasonably good mechanic. Electric mowers cost from $75.

Tobacco Curing and Grading

Flue cured tobacco requires heat for the curing process. In the last few years there has been a decided shift to automatically controlled, electrically operated coal stokers. They provide more uniform temperatures during yellowing, an automatic rise in temperature during drying, and an even heat day and night.

Considerable experimental work is also under way on improved methods of curing flue cured and

Burley tobacco involving the use of fans and heat.

It is reported by the USDA that the efficiency in grading tobacco is increased as much as 30 percent when fluorescent light is used in place of daylight.

Coal Stokers

Electrically operated stokers may be installed in most coal fired heating plants. They are available in different sizes. The stoker hopper is filled with coal once per day and clinkers removed. The remainder of the time the temperature set on the thermostat is maintained automatically whether you are at home or not. One of the big advantages claimed is a reduction in the number of colds suffered by occupants of the house. The electric power used is small. Some stokers have feed screws that extend into the coal bin so not even the hopper needs to be filled.

Electric Heat Controls

Fuel burning furnaces that are dependent on adjustment of drafts for heat regulation can be supplied with electric controls. A thermostat is placed in a living room. It opens and closes the drafts electrically to provide uniform heat.

Oil Burners

Where oil fuel is available, the oil burner furnishes an almost carefree source of heat. It is automatically controlled by a thermostat. Oil burners may be installed in old heating plants, but generally they are not as satisfactory or economical as heaters made especially for burning oil.

Heat Pumps

Heat pumps are commanding much attention right now. A number of trial installations have been made in both the North and South. The heat pump consists of a motor driven compressor similar to those in refrigerators. Instead of taking heat out of food in a box and dissipating it in the room, it takes its heat from the ground or from well water and transfers it to the house. In the summer time the process is reversed and the house cooled. Because there is only a *transfer* of heat, the amount of heat delivered per unit of electricity is 2 to 20 times that produced by direct electric heating. The greatest amount of heat is delivered

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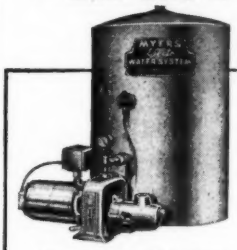

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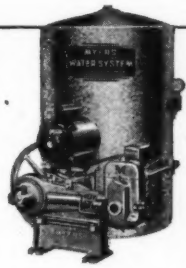

Myers Plunger Type Models for Shallow Wells: Pressures up to 250 pounds. Capacities up to 4500 gallons per hour.

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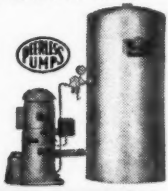
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when the difference in temperature is small. Two companies are building heating units of this type. They cost from $1000 to $1700.

Radio and Television

Radio calls for little comment. Small sets help to lighten the burden of kitchen work. Console models with record players are common in homes. Radios are popular in the milk barn. They tend to quiet both the cows and the milkers. Watch out for unknown makes of radios that may be selling at bargain prices.

Frequency modulation sets are increasing. Reception is clearer and with less static. They are not likely to replace present sets immediately. There are fewer FM broadcasting stations.

Television is just being born. Broadcasts will carry only about 50 miles, so television is not available on the farm unless you are within 50 miles of a broadcasting station. Sets are being improved and more stations installed. Color television is not commercially available as yet.

Electric House Heating

Electric house heating is not as yet competitive in cost with fuel burning heaters except in mild climates and where rates for electricity are 1c per kw-hr or less. Electric heating is usually done on a room basis with separate controls for each room. Large convection type heaters are most frequently used. They may be portable or set in the wall. Rooms are heated quickly and there is no labor or dirt from coal and ashes.

The use of portable heaters for bath rooms and for supplemental heat in other rooms is common practice. Either fan type or radiant heaters or electric steam radiators are suitable heaters. They cost from a few dollars to about $20 for the heavy duty types.

Farm Motors

Motors are of many types, designs and speeds depending on the type of electricity they are to use and the purpose they are to serve. In buying any motor be sure it is of the type, phase, voltage and speed you can use on your power circuit, and that it fits the job it is to do. Your power supplier can help you in this.

Single Phase Motors

Most farms have only single-phase, alternating current service available. Motors must, therefore, be of the single phase, alternating current types. Direct current or polyphase motors will not run on a single phase, alternating current electricity and the motors generally cannot be rebuilt for such use.

Direct current motors are used in industry, on 32 v lighting plant circuits and in automobiles. Not usable on 115 v, alternating current.

Three phase motors are lighter, cheaper and smaller than single-phase motors of the same speed and horsepower. Require special wiring and service. They can be used only on three phase circuits.

All single-phase motors run on pretty much the same principle, once they are up to speed. Differences in construction are in the methods of starting and getting the motors up to their rated speeds and also differences in efficiencies due to amount and kinds of materials and design.

Repulsion-Induction motors are most widely used for starting heavy loads. They are made in fractional horsepower sizes, but their greatest use is in sizes over 1 hp. They are good general purpose motors.

Capacitor start motors are becoming increasingly popular, particularly in the smaller sizes. They start well under medium heavy loads, create no radio interference. Good general shop motors in fractional horsepower sizes. They are made in sizes up to 5 hp.

Split-phase motors are limited almost entirely to sizes under ½ hp. They are not recommended where they must start heavy loads. They also cause flickering of lights on the line in starting. Many of them are sold because of their low price. They are satisfactory on easily started machines.

Fan motors are often of the

shaded pole type, a less costly way of providing a starting mechanism. They have low starting power. They are suitable on small fans which do not require much power until they are up to speed. Operating speed varies with load.

Universal motors are commonly used on vacuum cleaners, sewing machines, portable tools and small motion picture projectors. They run on either alternating or direct current, have power to start heavy loads, are high speed and light in weight. Speed varies widely depending on the load.

Cycles. Electricity supplied on rural lines is practically all 60 cycle. In some sections 50 cycle is used, and in a few, particularly in Canada, 25 cycles. Motors of one rating cannot be used on lines of a different rating.

Speeds. Sixty cycle motors are designed to run at 900, 1200, 1800 and 3600 rpm. The slower speed motors are heavier and cost more. All are equally efficient. The 1800 rpm motor is the one most commonly used. It may be listed as 1725, 1740 or 1760 rpm. That is its speed when fully loaded.

Voltage. Motors are often rated at 110-120 volts or 220-240 volts. That means they will run satisfactorily at any voltage within that range. If rated at 115v or 230v, they may also be used within these same ranges.

Most motors have their windings so designed that a 115 v motor may be used on 230 v circuits by making a simple change in connections in the connection box on the motor. Similarly, a motor used on 230 v may be connected for 115 v. If your motor is of that type, it will be marked 115-230 v on the nameplate. A connection diagram is usually given on the nameplate or attached to the wire terminals. Split phase motors are built for one voltage only.

Reversing Motors. Repulsion-Induction motors may usually have their direction of rotation reversed by shifting the brushes. There will be marks on the brush ring.

Most other types of motors can be reversed by changing connections in the terminal box on the motor. Not all motors are reversible.

Choice of Motors. In addition to the factors named, there will be differences in motors of the same type made by different manufacturers or made for different uses. Some are for short periods of use; some for continuous service. Some split-phase motors have centrifugal starting clutches. There are different oiling systems, different bearings, different types of frames. Some have built-in over load protection. Some use a much heavier

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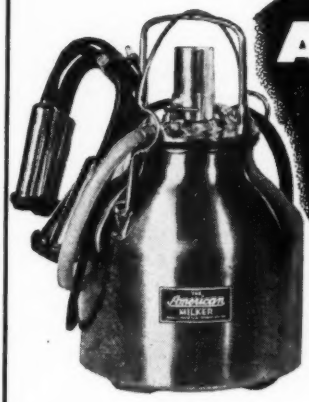

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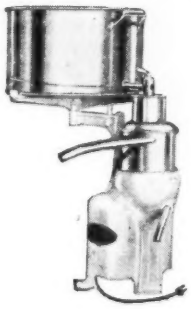

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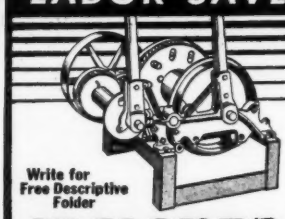

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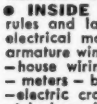

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Please send me "Audels Handy Book of Practical Electricity" for free examination. If satisfactory, I will send you $1 in 7 days, then $1 monthly until $4 is paid. Otherwise I will return it.

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starting current than others. At additional cost you can get variable speed motors or back-geared motors for slow speeds. You usually get what you pay for, *but* it is well for you to know what you want the motor to do before you buy it. It may save you money.

Motor Starters, Controls, Protection

Most motors are started by merely closing a switch. With motors of several horsepower or larger, a quick closing switch is desirable to prevent arcing. A magnetic switch performs this function. You close a circuit with a push-button and the magnet snaps in the motor switch. The push-button for starting may be at the motor or any distance from it; or a thermostat or pressure switch may be substituted for the push-button.

With some large motors that start under heavy load, it is desirable to use a controller that starts the motor under reduced voltage.

A fuse in the line supplying the motor *protects the wire* in that line from getting too hot due to overloading. It does not protect the motor. The reason the fuse does not protect the motor is that it must carry 3 or 4 times the running current in order to start the motor, and the overload current of the motor should be limited to about 1¼ times the running current. This protection is provided by thermal overload relays or trips, or sometimes by fusetrons for small motors. The overload relay or trip is usually combined with the starting switch.

Under voltage protection is also desirable for motors of 3 hp and larger. It prevents the motor from burning out if the voltage drops to a dangerously low point. This protection is also combined with some of the magnetic starting switches. These protective devices are much cheaper than rewinding a motor.

It is essential to have thermal protection on all large motors and on all motors of any size that run automatically. Thermal protection on small shop and utility motors is desirable, not only to save the motor, but to avoid fires that might be caused by overheated motors.

The Farm Shop

American farms have so much machinery and equipment that the farm shop is becoming an important economic factor in the farm program. It is an investment that pays dividends in time saved during busy periods, in longer life of machines, in improvements in machines and in home-built equipment to do the job better. Electric shop equipment is increasing.

Portable Motor

There are many jobs that a ¼, ⅓ or ½ hp motor can do in the shop and about the farm. To make it easier to use, equip it with a handle and rocker base.

The two frame bolts at the top of the motor may be loosened and wires fastened under them to make a handle. A 6 in. piece of hose or a wood handle over the wire makes it easier to carry. The rocker base is made of pieces of fork handle, broomstick or ½ in. pipe bolted crosswise to the motor base. These rockers must extend out beyond the motor pulley to keep the motor from twisting. Wherever the motor is to be used, nail down two square guide strips at the right distance for the belt used. Place one of the reducers between these strips. The motor should be tipped up to keep the belt tight.

Speed Reducers

Speed reducers of the gear type and jack-shaft type are made by several manufacturers. They reduce the 1725 rpm motor speed in different steps down to 60 rpm. One reducer gets down to 4 rpm. Some are adjustable to fit machines of different heights. A speed reducer can also be made at home by mounting the motor and a short jack-shaft with step pulleys on a plank about 24 in. long.

Air Compressor

Air compressors see service on the farm for inflating the many

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Just *Plug-in*

...You're ready to milk with this GLOBE "Grand Champion"

All you need is an electrical outlet! Just plug in anywhere, milk anywhere with your Globe "Grand Champion". Because EVERYTHING is in one compact, self-contained, hand-portable unit. . . . entire sealed power head right on top of the pail. No pipe lines to install. No push carts or tracks. It makes milking easier, simpler, BETTER than you've ever dreamed of before. In fact, this Globe "Grand Champion" gives you. . . . .

12 PLUS ADVANTAGES including: easier, quicker cleaning . . . due to simplified parts, seamless pail; 1-2-3-4 massaging-milking action that's easier on cow and stimulates fast milk let-down; positive pulsation timing; constant, steady vacuum; fingertip on-and-off vacuum control without reaching; 1-piece milk and air tube . . no lines to get tangled . . many other plus features.

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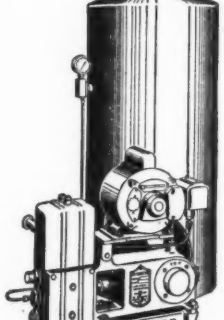
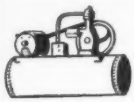


Shallow Well Model 350, with 42-gallon tank, ¼ hp motor.

tires on cars, tractors, trucks and farm machines, for cleaning farm tractors and equipment, for paint and insecticide spraying, whitewashing henhouses, etc. Compressors are operated by ¼ hp motors. For some jobs pressure tanks are not needed. With small pressure tanks, compressors may be stationary shop equipment or mounted on trucks for use about the farmstead or even hauled to the field with a tank of air. All pressure tanks should be equipped with safety valves to prevent explosive pressures. Pressure switches for starting and stopping the motor are desirable. Many companies build these compressor units. Some farmers assemble their own.



Grinders

Grindstones and small emory wheels may be driven by ¼ hp motors. Heavy duty grinders for plow sharpening, grinding welds, or for wire-brushing, call for ½ to 1 hp motors. Grindstones of 24 to 30 in. diameter should be run at 65 to 50 rpm. Higher speeds will throw off water. The surface speeds of emory wheels should be 4000 to 6000 ft per min. At 5000 ft a 4 in. stone should run at 4775 rpm; a 5 in. stone, 3820 rpm; 6 in., 3180 rpm; 8 in., 2387 rpm; and 10 in., 1910 rpm.

Motor driven grinders are available in a variety of styles. Some have attachments for holding sickles, discs and tools for grinding. Special holders are made for grinding twist drills.

Bench-Saws, Table-Saws, Hand-Saws

Electric saws suitable for farm building and repair operations are of three or possibly four types.

Small **table saws** to be used on a bench serve many purposes. An 8 in. saw will handle about 2¼ in. material. Such saws are usually equipped with safety guards, miter gauges and adjustable table tops or saws. They are good for cabinet work, hens nests, repairs, and may be used for sawing long boards if support frames are built.

Table saws with large tables and frames that stand on the floor are used on many farms. They are general purpose saws. Such tables with adjustable saws, and supports for the motor under the table are available from manufacturers. One has an adjustable saw driven through a flexible shaft. Many of these table saws have also been

improvised in the farm shop. Some combine a saw with a tool grinder. Table saws are usually driven by motors of ½ hp.

Circular **hand saws** weighing 15 to 20 lbs. and with capacities of 1¾ to 2¾ in. material are being used increasingly where much sawing is to be done. They have special blades for cross-cutting, ripping and mitering. Some have tilting bases for bevel cuts and some have frames for using the saw as a stationary table unit.

Bench **saw speeds** should be 10,000 ft per min, or for an 8 in. saw, 4780 rpm; 10 in. 3820 rpm; 12 in. 3180 rpm.

Band saws are useful for special sawing jobs. They are available in ¼ hp sizes.

Drills

Drills of the types used in garages are also suitable for farm shops. Electric drills are rated in the maximum size of drill they will handle in drilling steel. Most of the portable drills have stands available for mounting them as bench drills. Half inch drills will ordinarily handle ⅝ in. wood augers, 2½ in. hole saws, wire brushes and abrasive pads or buffers for cleaning or polishing cars. They are good pieces of equipment for the farm shop. Hand operated post drills may be adapted to driving with ¼ hp motors by having the fly-wheel machined to take a V belt, or attaching a V pulley to the fly-wheel.

Other Power Tools

In shops where much work is done and where the farmer has special mechanical ability or has a mechanic for keeping farm equipment in repair, other shop equipment may be a good investment. Screw cutting lathes make many repair jobs possible. For wood working, lathes, small planers, and sanders fit into repair work and side-line industries such as making tool handles, brooders, bee hives and trap nests. They help keep the interest of young farmers on the farm.

Battery Chargers

Battery chargers may be of the tube or plate converter type, or small motor generator sets. Manufactured units are of the first types. They are made in small sizes for trickle charging and in larger sizes for regular charging. Homemade units usually consist of

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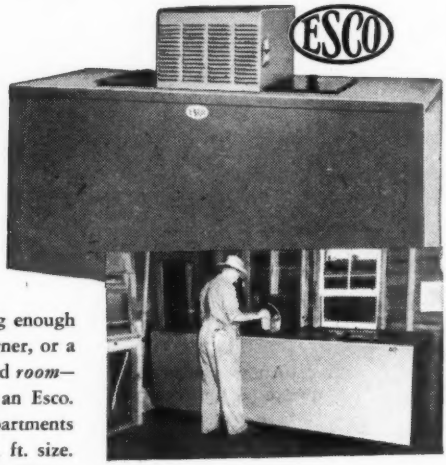

A farm freezer that isn't big enough is like a range with one burner, or a single bed for two. You need *room*—and that's what you get in an Esco. Big, *big* zero storage compartments . . . in the 16, 24 or 40 cu. ft. size. PLUS a separate freezing compartment with air-blast fan that freezes *3 times faster* than in still air. Freezes the flavor in.

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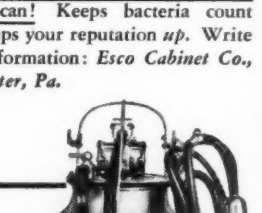
Yes, *you* get best results when the *cow* is suited! And no other milker can match Empire's patented teat-cups, duplicating the natural sucking action of the calf. Famous for 40 years. Write for booklet. *Empire Milking Machine Co., Div. of Esco Cabinet Co., West Chester, Pa.*



a ¾ or ½ hp motor driving a c generator. The purpose of charger is to change 115 v alte nating current into 6-8 v dire current for charging. They are useful in keeping batteries charge without removing them from can and in aiding winter starting when batteries are low.

Belts for Motor Drives

The power transmitted by belts depends on the width and thickness of the belt and its speed of travel. Motors turn at about 1750 rpm; engines usually at about 450 rpm. For efficient flat-belt motor drives, it is best to run the belts at about 5000 ft per min, using light weight belts no wider than necessary for the power to be transmitted. For example, 3 or 5 in. single-ply belts for 3 to 5 hp motors. Larger pulleys permit use of lighter belts.

V belt drives are more satisfactory for small motors. Half-inch V belts on 1725 rpm motors will transmit the following approximate horsepower:

Motor pulley size	2"	3"	4"
Horsepower transmitted	0.6	1.0	1.4

Belts 11/-6" wide will transmit about 1.4 times as much power as the ½" size but should not be used on such small pulleys. If the motor has a V pulley and the driven pulley is 12 in. in diameter or larger, the driven pulley may be either a V or flat pulley.

Welders

Within the past five years welders have become very popular in the farm shop. They permit making many repairs and reinforcing machines without taking down machines or removing broken parts. They have also been responsible for the making of many special tools and machines for saving labor.

Welders are undesirable equipment on farm lines from the standpoint of the power supplier. They require heavy service wires and transformers and interfere with voltage regulation without providing much revenue. To reduce the line and service difficulties, welder manufacturers have cooperated with power suppliers in adopting specifications for 130 and

180 ampere Farm Welders of the transformer type. These welders will do a good job of welding, brazing and soldering. Most of them may be used on 3 kva transformers, and many power companies now permit their use without any extra service charge. Welders which have a heavier current demand than these MEMA Farm Welders, and particularly those used for setting up competitive welding shops, usually must pay a special service charge. Many companies are now making welders especially for farm use. With the new coated electrodes available, they are suitable for all farm repair jobs. The price is also lower than for other types.

Brazing and soldering may be done nicely with farm welders using the carbon arc torch for heating. For some jobs, brazing is much easier and just as satisfactory as welding.

To do good welding, you should take a training course. You must devote some time to practicing. Before investing in a welder be sure to discuss it with your power supplier to learn what welders are permitted on the line.

Direct current welders consisting of ac motor driven dc generators have some advantages over transformer type welders for certain types of work. With the improvements in welding rods, however, transformer type welders are outselling dc welders for general repair work. Motor-generator welders may be used on farm lines under the same rules as motors for any other purpose. Most dc welders are made in sizes larger than 5 hp.

Transformer welders are available in 40 to 50 ampere sizes for use on 115 volt circuits. They are hobby shop welders but with patience may be used for many repair jobs and for brazing and soldering. Be sure such welders do not draw more than 15 amperes if they are to be used on appliance circuits.

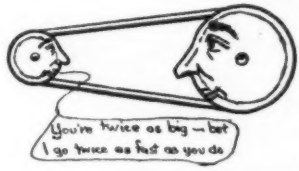
Direct current welders may be made from old lighting plant generators or from Dodge car generators. The generators must be rewired and rebuilt. The resulting equipment is only second rate.

Welders selling for $2.95 to $19.95 and without Underwriter's approval should, in general, be avoided. They have little value as welders and may be dangerous.

Pulley Speeds and Sizes

The rule for determining pulley speeds and sizes is:

driving pulley diam x its rpm= driven pulley diam x its rpm



If you know three of the factors you can find the fourth. For example: Motor pulley is 3"; rpm 1725. You want the machine to run at 520 rpm. 3 x 1725 equals diam x 520. Or, 3 x 1725 divided by 520 equals 9.9. Use 10" pulley.

Light

Lamps

Hundreds of different types and sizes of electric lamps are available.

Most of them are designed to produce light. Some, however, have heating and drying as their primary function. Others produce ultraviolet.

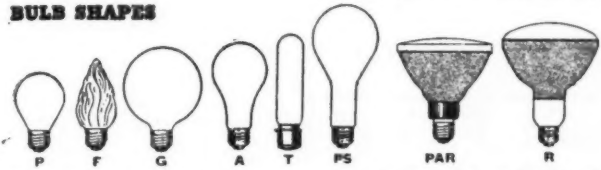
Three general types of lamps are used for lighting: mercury arc lamps, incandescent lamps and fluorescent lamps. Carbon arc lamps were the first used. They are seldom used now except in theatre projectors, photographic lighting and for therapeutic purposes.

Lamp Bulb Designation

Lamp manufacturers have adopted a method of specifying the shape and size of incandescent and fluorescent lamps. The designation consists of letters and figures. The letters indicate the shape of the lamp, and the figures, the diameter in eights of an inch. Here are the shapes

A—The common shape of today's household lamps.
F—Flame shaped.
G—Globular.
P—Pear shaped.
PS—Pear shaped with straight neck.
PAR—Hard glass reflector or projector type for outside use.
R—Reflector shaped lamps with inside reflecting coating of aluminum.
T—Tubular.

BULB SHAPES



Examples: An "A-20" lamp is the common lamp shape, 20-⅛" or 2½" in diameter. An "R-40" is a reflector type lamp 5" in diameter. A "T-8" lamp is a tubular lamp 1" in diameter.

For complete lamp specification, the type, wattage, voltage, color, type of base, etc., must be given.

Incandescent Lamps

Incandescent lamps consist of a glass bulb containing a tungsten wire filament which is heated by electricity to white heat (incandescence) to produce the light.

Standard incandescent lamps are now made in the following wattages: 6, 10, 15, 25, 40, 60, 75, 100, 150, 200, 300, 500, 750, 1000, 1500. They are available for use on circuits of several voltage ranges. The 120 v lamps are most common. Lamps of many other types and sizes may be obtained on order.

Lamps of 25 watts and smaller are vacuum type; sizes larger than 25 watts are filled with an inert gas. Here are some differences in them. Vacuum type are cool when lighted; 93-94 percent of the heat given off is radiant heat; the bulbs darken all over as they get old.

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Send me, without obligations, FREE TEAT CUP CIRCULAR, Proof of Success, details of Guaranteed Money Back 30 Day Milking Trial.

NAME.....

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Name of Machine Used.....

Gas filled are hot when lighted; 70 to 87 percent of the heat is radiant heat; the necks darken if burned bulb down or the bulbs darken if burned bulb up. The darkening is caused by small particles of the tungsten filament vaporized by heat during the life of the lamp.

The average actual hours of burning for which most lamps are designed is 1000 hours (See Lighting Economics).

If a 115 volt bulb is used on a 120 volt circuit the life of the lamp is decreased but the amount of light given off is much increased. Also, because of the higher efficiency at higher voltage the electricity used per unit of light is less. If used on a 110 volt circuit, the lamp lasts longer but the light is considerably reduced and the electricity costs more per unit of light. Specifically a 1 percent increase in voltage gives about a 3 percent increase in light output, or a 1 percent decrease in voltage reduces the light output 3 percent.

Reflectors, Enclosing Globes, Shades, Wall Tints

Reflectors are used for directing the light where you want it and reducing waste of light. For use in and about farm buildings they are of the dome and shallow bowl types. Dome and shallow bowl reflectors give a wide distribution over flat surfaces like a poultry-house floor. Projector types are used for spot-lighting and flood-lighting. White porcelain has excellent light reflecting properties and is easy to keep clean. Polished metal or porcelain is good for reflecting heat. Aluminum should always be used to reflect ultra-violet. Reflectors *must be kept clean* or they lose their efficiency.

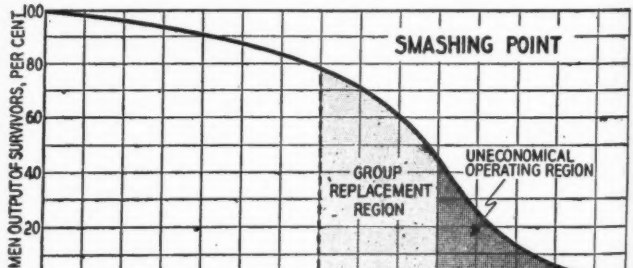
Enclosing globes of white glass or similar material are used to diffuse light and reduce glare. Standard lamps are frosted on the inside for this same reason. The enclosing globe is added because the larger the light source, the less the glare and the softer the shadows—Better seeing.

Shades on lamps direct the light to where it is wanted and at the same time act as diffusers for the direct rays. Shades that are white or light colored on the under side reflect the most light. Light colored or translucent shades permit a soft glow to illuminate the room. Heavy, dark colored, ornate shades are of doubtful decorative value and of no other value. Flaring shades spread the light better than straight-sided shades.

The color and texture of wall **coverings, paints, floor coverings** and furnishings have much to do with effective lighting. Light colored linoleums and wall paints are best for kitchens for either day or night lighting. They can add 50 to 75 percent of the effective illumination with the same light sources.

Lighting Economics

We install lamps to see. The part electricity plays in seeing is providing the light. So we should consider that we *buy light*. To get the most light for our money, we must have properly designed fixtures, correctly placed, have suitable reflecting surfaces on walls, ceilings and floors and use enough lamps and electricity. Once the lighting units are installed, the cost of light is the cost of lamp replace-



This chart is from the General Electric Lamp Bulletin. It was prepared for large users of lamps such as factories, theatres and stores. The area under the curve represents the total light (lumens) produced by an installation of lamps. Note that the amount of light drops off as the lamps are used longer. The darker shaded part indicates that it is cheaper to smash the lamps and replace them than to continue using them. The light shaded area is where it is economical to put in new lamps rather than to wait for them to burn out.

ment plus the cost of electricity used. Take a 60 watt lamp that costs 12c. In its 1000 hours of burning it uses 60 kw-hrs costing perhaps $1.20. The cost of the light is about one-tenth for the lamp and nine-tenths for the electricity. The lamp decreases in efficiency with use, so that by the end of 1000 hours you would save money to replace it even if it did not burn out.

Dirty lamps and reflectors run up the cost of lighting 50 to 75 per cent. Dirt on a lamp may reduce its light output one-half or more.

Reflector type lamps of 150w cost $1.05 as against 20c for a standard 150w lamp. It should be remembered, however, that the reflector inside the lamp remains clean and the additional light you get on the work may more than offset the difference in cost.

Yard Lights

Yard lights for doing winter chores, for welcoming visitors, for discouraging prowlers, are some of the most appreciated lights on the farm. Wiring should be provided to control at least part of the yard lights by three-way and four-way switches from house, garage and barn or milk-house.

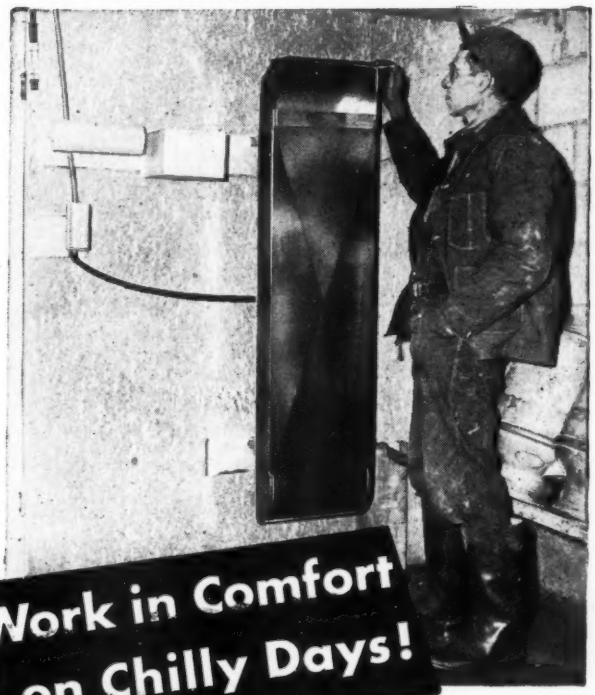
Pointers on yard lights: A light directly over the top of a pole casts no shadows. A light out from the corner of a building lights two sides of it. The higher the lamp, the wider the distribution of light. You can see objects between you and the light better than those beyond the light. Frequently farmers install lamps that are too small; 300 watt lamps are not too large. They are not on for many hours, so the cost is low. Protect lamps from rain breakage either with suitable reflectors, or by using hard glass reflector type lamps. Be sure the lamp is located where you can replace it easily with *your ladder* placed against a solid support, or from a window or special small door in the building wall. Have the bracket support *solid* or the wind may vibrate it so the lamp will work loose.

Insect Repellent Lamps. The term is misleading. These lamps are stained yellow. Insects do not see yellow so they are not attracted to the lamps as they are to white or blue light.

Fluorescent Lamps

Fluorescent lamps are of the tube type. Light is given off by a powder coating on the inside of the tube which glows when activated by ultra-violet waves. The ultra-violet is produced by a flow of electricity through mercury vapor within the tube. The lamp requires special auxiliaries consisting of a starter and a balast which are made a part of the fixture.

Fluorescent lamps produce 2½ or 3 times as much light per unit of electricity as incandescent lamps. They are cool to the touch. They produce whiter light and are available in various shades of color. They produce a less glaring light with softer shadows. The continuous use life is about three times as long as incandescents but is short-



Whatever the weather, and wherever the chores may be —Milk House, Poultry House, Barn, Greenhouse or Garage —a CROWN Electric Space Heater with Thermostat Control puts low cost, safe, clean, odorless, easy-to-work-in warmth at your finger-tips.

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ened by frequently turning the lamps on and off. On the other hand, fluorescent lamps cost several times as much as incandescent lamps. They do not start well or operate at full efficiency in cold rooms or out of doors in cold weather. The cost of fixtures and auxiliaries is relatively high. Auxiliaries as well as lamps have to be replaced. The lamps may create static in nearby radios. The quality of some fluorescent light, being different from incandescent light, may change the appearance of foods, draperies, dresses, complexions. In factories and large commercial establishments where many lamps are used, fluorescents may save on lighting costs. On farms the total cost of light would probably be about the same as for incandescent lights. The kitchen and work shop are the most favorable places for fluorescents at present.

Farm Lighting Design

Without going into great detail, the best information we can give on lighting design is Joe Ditchman's formula for a "Lighting Engineer in One Easy Lesson." Squirt light the same way you squirt water. Get it on the thing you want to wet without getting it in your own or the other fellow's eyes. If you want to hose out a gutter, you want a small, solid stream. If you are wetting a lawn,

you need a broad spray. Just remember that when you squirt light on a black sock being darned or a book being read, you also need some general "spraying" in the room to avoid sharp contrasts that tire the eyes.

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Ultra Violet

There are different qualities of ultra-violet just as there are different colors of light. The quality of ultra violet depends upon its wave length. Wave lengths are measured in Angstrom units. An Angstrom unit is about four billionths of an inch long. Pretty short! Black light lamps produce waves of 3200 to 4000 Angstroms; Sunlamps, 2800 to 3200 A; germicidal waves have their greatest killing power at 2537 A; ozone is made by waves of about 2000 A. A Sunlamp is not suitable for killing germs and a germicidal lamp is not intended for producing vitamin D. Practically there is some slight overlapping of wave bands in each of the lamps.

Sunlamps are used on humans and on livestock to produce effects similar to the sun. Vitamin D is a product. Safe exposure to the lamps without excessive sunburn must be learned by trial. Start with, say 10 to 15 minutes at 3 feet. If the distance from the lamp is cut in half, the sun-burning effect will be four times as great. Protect human eyes from direct radiation.

The S-4, RS-4 (125 watt), and the S-1 (500 watt) Sunlamps require special transformers costing $12 to $20. The S-4 lamp has largely replaced the S-1 because of its effiency and lower wattage. A recently available 275w RS type lamp has the starting auxiliaries within the lamp itself and may be used directly on 115 volts. It costs about $10. Carbon arc lamps are also available for home use.

There have been some favorable reports on the use of Sunlamps for promoting health in cattle. Other reports have said there were no observable effects. (See also Poultry Farm Uses).

Germicidal and bactericidal lamps and Sterilamps have demonstrated conclusively their ability to kill germs, molds and bacteria in air and on surfaces hit by the rays. The rays do not penetrate beneath the surface. At present the most effective use of the rays is in killing

germs in the air and in providing a "screen" of rays through which germs cannot pass alive. Germicidal rays produce painful but not permanent eye irritation in humans and animals. The rays should be shielded so they will not enter the eyes directly.

Germicidal lamps are practically identical with fluorescent lamps, except that the germicidals are in special ultra-violet transmitting tubes that contain no fluorescent powder. The same fixtures may be used for both types. Aluminum reflectors should be used for all ultra-violet.

Ordinary window glass stops ultra-violet waves. Glass is an effective stopper for either germicidal or therapeutic rays.

Infra Red

Infra-red waves are heat waves. The shorter ones penetrate short distances beneath the surface and are therefore effective for heating nerves and muscles, for drying paints, etc. Short heat waves from the sun penetrate hotbed glass or your auto top and glass. Inside they are absorbed and changed to long wave heat. The long waves cannot pass back through the glass or top.

About 85 percent of the electricity that goes into ordinary incandescent lamps is changed into infra-red heat waves. Ordinary lamps are therefore good, cheap sources of infra-red. Special infra-red heat and drying lamps are almost identical with common incandescent lamps except that the filaments are heavier and do not glow as brightly. The lamps also last about five times as long, they are desirable where intense light is not wanted. Lamps may be used as heaters in a number of places on the farm. They are used in some chick brooders, in pig and lamb brooders, in hot beds, to keep poultry fountains and small pump houses from freezing, to warm the car engine in winter, for a small amount of heat in the milk house. Penetrating infra-red is being used increasingly for relief of pain, soreness in muscles, inflamation or wherever heat is required.

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Water Pumping and Use

Running Water for the Farm

Running water frequently can be supplied on the farm at less cost than in city homes. City dwellers pay for it in taxes. In the country we buy wells and water systems. Running water and the health, comfort and saving of labor it can provide is one of the greatest blessings one can have. Shame on farmers who have other modern equipment but no running water.

Proper procedure in installing running water is to decide for what, where and how you want to use the water. Then get a water system to fit your needs. Don't buy a pump and then try to fit your farm to it.

Water Systems

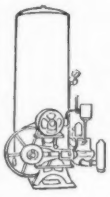
Water systems consist of bath rooms, kitchen sinks, septic tanks, inside flush toilets, water tanks, troughs, drinking bowls for livestock, the pipe and plumbing to supply them, the elevated or pressure water storage tanks; and an electric pump to supply water from a source that has been tested for purity. From the pump manufacturer's standpoint, a water system consists of a pump, motor, pressure tank, and the controls to operate them.

Farm Water Requirements

	Approx. Gallons per Day
For each member of the family, for all purposes, including kitchen, toilet, bath and laundry	25
Each horse	10
Each cow	15
Each hog	3
Each sheep	1½
Each 100 chickens	4
	Gallons
Filling the ordinary lavatory	1½
For the average bathtub	30
Each shower bath	20-30
Flushing a water closet	6
	Gal per hr
½ in. hose with nozzle	200
¾ in. hose with nozzle	275-300
Lawn sprinkler	120

(Water use will vary with different seasons of the year. It will also increase as the water becomes more easily available.)

The capacity of the pump selected should be in excess of the total quantity of water ever to be used at one time. If you are using a ¾ in. hose, the pump should have a capacity of greater than 300 gal per hr or the water would just dribble at the sink or barn. Pumps should run only a few hours per day.



A 40 gallon pressure tank operating at 20 to 40 pounds pressure will supply only 6 to 10 gallons of water before the pump starts, and a maximum of only 14 gallons when the current is off. Other size pressure tanks supply in the same proportion.

A 40 gallon tank is commonly supplied. It keeps the pump from starting and stopping every time water is drawn. For emergency storage, large tanks should be used. A 500 gallon tank will supply about 175 gallons. Or, if your water supply is small, you should use a large storage tank with a small capacity pump to provide for heavy, short period demands. All water systems may be provided with fresh water valves which will supply water direct from the well for drinking purposes.

Cost of Pumping

The power used in supplying running water varies with the depth of well, amount of water used, lift, pressure, type of pump. The average is 20 to 25 kw-hr per month. The cost is usually less than 5c per 1000 gallons.

Types of Pumps

Pumps are made for shallow wells and for deep wells. A shallow well is one where the lift (vertical distance from the water in the well to the pump valves after the pump has been running for some time) is under 22 feet.

Shallow well reciprocating pumps are small, inexpensive, easy to repair and quite efficient. Very satisfactory for shallow wells. Pump need not be over the well.

Turbine pumps have only one moving part. They are simple in construction and quiet running. Good where water does not contain sand. Efficient. Used on shallow wells.

Centrifugal pumps are simple and rugged in construction and low in cost. They are suitable for handling large quantities of clean or dirty water under low heads or in combination with jets for higher heads. Has only one moving part. Used widely for irrigation, for pumping into open tanks, for sump pumps.

Deep well pumps consist of a cylinder below the water in the well operated by rods from a working head placed at the top of the well. They are the most efficient pumps to use for lifts of 100 ft. and more. Somewhat more laborious to install and repair than other types and higher in first cost.

Ejector or Jet pumps combine a shallow well pump with an ejector or jet which serves to boost the water in the well up to within reach of the suction of the shallow well unit. The pumps, originally intended for lifts between about 22 ft. and 100 ft. have now been adapted also for shallow well use. In the latter case the jet is in the pump itself. For deep well use, the jet is placed in the bottom of the well. The pump does not need to be placed over the well. The efficiency of jet pumps drops off with increasing lift, so they are seldom used for lifts of over 100 ft. Ten years ago jet pumps were new. In 1946 there were more jet pumps sold than all other types combined.

Rotary or Gear Pumps have few moving parts. They have good suction lift and discharge against pressure. They are used more for oils, gasoline, etc than for water systems.

Irrigation pumps are generally of the centrifugal or turbine type. These turbine pumps are quite different in design from the turbines used for shallow well water systems. They are improved, multi-stage centrifugals used for pumping large quantities of water against high heads or from deep wells. Some of them are as small as 6 in. in diameter and go down inside a well casing. They are driven through shafts by direct connected motors, usually at the ground surface.

Ordinary single stage centrifugal pumps are good for total heads of about 70 feet. If the lift is more than 70 feet, two or more pumps (stages) are coupled together to produce the higher pressure. A rough estimate of the number of gallons per minute discharged by a single stage centrifugal pump is ½ the diameter of the discharge in inches squared multiplied by 100.

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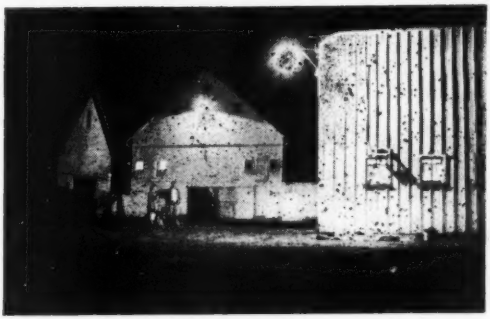


G-E Reflector lamp

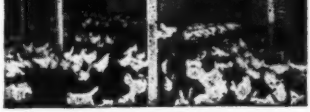
provides effective way to light your haymow. Built-in reflector makes for continued efficiency, good use of light, to speed work, help prevent accidents. (Check your state or local code for installation requirements.) 150-watt reflector lamp... spot or flood **$1.05.**

G-E Projector lamp

helps light your yard at night for easier, safer chore handling... protection against accidents and prowlers. Made of weather-proof "oven" glass; built-in reflector. 150-watt spot or flood . . . . **$1.55.**

G-E Fluorescent lamp

gives you "daylight" night or day to speed work, save time in the kitchen. Put two 40-watts in ceiling fixture; one each, over counters and sink, and get rid of your shadow. 40-watt **$1.**



G-E Germicidal lamp

makes for healthier flocks. Supplies germ-killing ultra-violet to lessen spread of airborne disease. Good in incubators, brooder and laying houses. *Must be used in proper equipment.* Lamp only, 30-watt . . **$6.75.**

G-E 100-watt

Use it in reflector to light your feed room. Makes for easier, faster work. Fills many farm needs. 100-watt **15¢.**

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For example: A 4" pump discharges 2 x 2 x 100=400 gal per min. A 6" pump discharges 3 x 3 x 100=900 gal per min.

Where irrigation pumps are used quite continuously for 3 to 6 months in the year, as in arid regions, it is important to get highly efficient pumps to keep down pumping costs. High speed, multi-stage centrifugals are very efficient. In the East where the pumps may be used for only a week or two for supplemental irrigation, less costly pumps may answer the purpose.

For sprinkler irrigation, centrifugals, turbines or reciprocating pumps may be used depending on the head or pressure to be pumped against.

Sump pumps are used primarily in cellars that have no drains. They are small, low-cost centrifugal pumps which rest on the bottom of a sump and are driven by a direct connected motor on a long shaft reaching above the water. Water is discharged at the surface. Usually use ¼ hp motors and are started and stopped by a float valve.

Friction of Water in Pipes

Flow Gal per Min	Nominal Diameter of Pipe								
	⅜"	½"	¾"	1"	1¼"	1½"	2"	2½"	3"
	Head Loss—Feet per 100 Feet Pipe								
1	6.4	2.1							
2	23.3	7.4	1.9						
3	49.0	15.8	4.1	1.26					
4	84.0	27.0	7.0	2.14	0.57	0.26			
5	126.0	41.0	10.5	3.25	0.84	0.40			
10		147.0	38.0	11.7	3.05	1.43	0.50	0.17	0.07
15			80.0	25.0	6.50	3.0	1.08	0.36	0.15
20			136.0	42.0	11.10	5.2	1.82	0.61	0.25
25				64.0	16.6	7.8	2.73	0.92	0.38
30				89.0	23.5	11.0	3.84	1.29	0.54
35				119.0	31.2	14.7	5.1	1.72	0.75
40				152.0	40.0	18.8	6.6	2.20	0.91
45					50.0	23.2	8.2	2.80	1.15
50					60.0	28.4	9.9	3.32	1.36
70					113.0	53.0	18.4	6.20	2.57
75						60.0	20.9	7.1	3.00
100						102	35.8	12.0	4.96
120						143	50.0	16.8	7.0
125							54.0	18.2	7.6
150							76.0	25.5	10.5
175							102	33.8	14.0
200							129	43.1	17.8

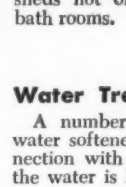
The above table is based on wrought iron pipe that has been in use for 15 years. For friction in new pipe, multiply losses by 0.7. To change feet of head to pounds pressure, multiply by 0.43

Shower Cabinets

Metal shower cabinets are becoming increasingly popular. They come complete with shower fixtures and drain. They may be installed in many places such as closets, ends of halls, pantries, porches, shops or sheds not originally intended for bath rooms.

Water Treatment

A number of companies make water softeners to be used in connection with water systems where the water is hard. These softeners use a tank of zeolite, an inert chemical, to precipitate out the lime. The zeolite is regenerated by washing it with common salt brine. Some of the systems are almost automatic in operation. Soft water saves soap, labor and makes dish and clothes washing easier.



Other foreign matter such as iron may be removed from water by special treating processes. Before installing water treatment equipment, samples of water should be sent to manufacturer for test.

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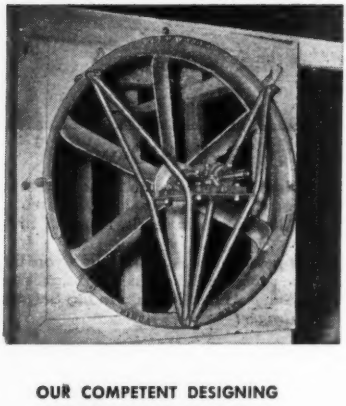

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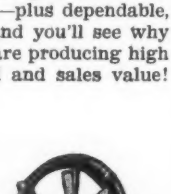

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Frost-Proof Hydrants

These hydrants have been very popular with our readers. They provide running water out of doors in the winter time with an arrangement for the hydrant to drain below frostline before it freezes.

Water Warmers for Livestock

Poultry water warmers are of several types. The immersion type is placed directly in the water. It has a heating element of about 150 watts controlled by a thermostat to hold the water at about 50°. It costs about $4.

Small hot-plates on which fountains may be placed have just the right wattage to keep the fountain from freezing.

Some poultrymen use soil heating cable placed in the bottoms of long V shaped water troughs and covered with hot asphalt. Others enclose a section under the water pans and place a lamp in the enclosure.

Soil heating cable to keep pipes from freezing is becoming widely used. The cable is attached to the pipes with tire tape or is wound around the pipe, valves and fittings. The pipes can then be covered with insulating material to save electricity. The system is usually controlled by a brooder thermostat set at 33° and placed in the coldest spot along the pipe.

Livestock water warmers are of several kinds. Thermostatically controlled **cast iron heaters** suitable for placing in stock tanks have been used successfully for a number of years. They may be placed in open bottom barrels in the tanks to conserve electricity. They are rugged in construction. 1000 watt; cost about $35.

A heater called the **De-Icer** was placed on the market several years ago. It floats on the water in the tank. It makes no attempt to heat the water but it does keep the ice from forming in a small area where the stock can drink. 300 watt; cost about $20.

A thermostatically controlled, electrically heated **drinking cup** is the newest development. It is like a drinking cup in a dairy barn, housed in a metal cylinder 12 in. in diameter and 4 ft long. It is for outdoor use and may be buried at the right depth for cows, sheep or hogs. One cup will care for 10 or more cows.

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Water Heating

The choice of size of a water heater depends upon the amount of hot water used, the distribution of use during the day and the electric rate for water heating. Water heater tanks used on a continuous current metered rate or flat rate may be somewhat smaller than those used on off-peak rates. The off-peak rate is a special rate granted for current used at night or when the demand is low. The water heater is so wired that it cannot use electricity at other times. Under these conditions it is necessary to heat and store the water for later use. If a 30 to 50 gal tank would do for continuous heating, a 50 to 80 gallon size might be needed for off-peak heating. No farm should have less than a 30 gallon heater. Most should have 50 to 100 gallon sizes.

Types of Water Heaters

Pressure heaters are made in tank sizes of 2 gallons to 100 gallons or larger. The water is piped into the tank from the water system under pressure. Tanks are insulated. Heaters are placed near the bottom of the tank. There may also be one near the top for heating a small quantity of water quickly. Hot water is drawn from the top of the tank. The bottom heater may be on off-peak wiring and the top one on the metered rate. These heaters may be round or square, tall or short. They are used in the home and are also suitable for the milk house. They are equipped with heating elements of 1 to 4 kilowatts.

Pour-in heaters are made so that to get out a gallon of hot water, you must pour in a gallon of cold water. The cold water is baffled to stay at the bottom of the tank. These have become very popular. There is little danger of burning out heating elements.

Open-top heaters are made for milk house use. They come in sizes of about 3 to 10 gallons. You take off a lid; pour in the water from a bucket or faucet. When the water is heated, it is drawn from a faucet at the bottom of the tank. Advantage: The last water drawn is as hot as the first. Disadvantage: The heating element may burn out if water gets low.

Pail heaters provide about 3 gallons of hot water. The heating element of one make is fastened to the wall. When a pail of water is hung on the heater frame with the immersion heater extending into the water, the electricity is turned on. When the pail is lifted off, the heat is turned off. Another has a thermostat controlled heater in the bottom of the pail.

Immersion heaters approved by the Underwriter's Laboratories are available from a few manufacturers. One is a 1300 watt heater that may be immersed in a milk can or pail. A new one heats water to 130° for massaging cows' udders. They should not be used in direct contact with milk or mash.

Some cheap immersion heaters having contacts exposed to the wa-

No. 89
½" Drill
$29.95
SpeedWay
Why tote around a heavy "production type" drill (designed to run continuously at full capacity on some production line), when you can get a light weight handy SpeedWay Drill that makes all ordinary drilling easier and gives you years of service. Regardless of what you pay, you cannot get a better ½" drill for general use, than the SpeedWay No. 89. With its No. 209 drill stand it doubles as a capable drill press at savings that will go a long way in paying for other equipment. You'll find the same sensible economy in the little SpeedWay No. 69 Drill and its No. 229 drill stand. This low cost pistol grip drill will drill straight holes up to ¼" diameter in steel.
Write for circular and name of your nearest dealer.
No. 209
Drill Stand
(Less Drill)
$12.95
No. 69 ¼" Drill
$11.80
No. 229
Drill Stand
(Less Drill)
$5.25
SPEEDWAY MFG. CO.
1844 South 52nd Avenue, Cicero, Ill.

ter have been on the market at $3 to $8. They do not have Underwriter's approval and are definitely dangerous pieces of equipment to use. Avoid them.

Instantaneous Water Heaters are devices which clamp to or take the place of a water faucet. When the water is turned on, the electricity turns on with it. The water heats as it flows out. Impractical for most farm lines. They make sudden demands for as much electricity as 5 or 10 hp motors.

Hot plates of the heavy duty type may be used to advantage for water heating where only small quantities are needed.

Steam accumulators (see Dairy uses) when used for sterilizing utensils may also be used to provide hot water.

Electric Controls

Throughout this issue we have mentioned automatic operation, time switches, pressure controls

and thermostats many times. One of the big advantages of electricity is its ease of control. Many types of thermal controls will regulate temperatures by turning on and off soil heating cable, oven heaters, brooders, furnace blower motors, greenhouse ventilators and the like. Some of these thermostats sell for as little as $1.50. Some types control the temperatures only within 5° to 10°; others will hold within 1°. Some will handle large currents, some small. Some close a switch as the temperature falls (for hotbeds); others as the temperature rises (for refrigerators).

Pressure switches serve similar purposes of starting and stopping motors on water systems, air compressors and refrigeration machines.

Time clocks are made by many manufacturers to control poultry house lights, oven or roaster cooking, the radio and many other operations.

Humidistats are also available for starting and stopping motors or heaters to regulate the moisture in the air.

Electric eyes will control electric devices for opening doors and gates, sounding burglar alarms, turning lights on on dark days,

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Easily Assembled • Fireproof
Rodent Proof • Space-Saving
Life-Long Construction

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NEW PORTABLE AIR COMPRESSOR

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Saves time, labor and equipment! Portable—easily carried anywhere. Just plug into electric outlet and it's ready for use—inflating tires, greasing car, tractor or machinery; spraying paint, insecticides, rust preventives; cleaning radiators, motors and machinery. Strong pressed steel welded construction. Moderately priced. A necessity on the modern farm! General Products Div., Tokheim Oil Tank & Pump Co., Fort Wayne 1, Indiana

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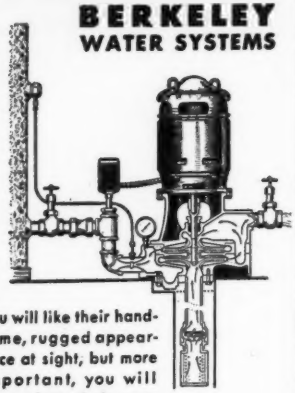
WATER SYSTEMS



You will like their handsome, rugged appearance at sight, but more important, you will appreciate their year 'round dependability.

Whatever your water needs or well conditions, your Berkeley dealer will gladly and without obligation estimate on the best installation.

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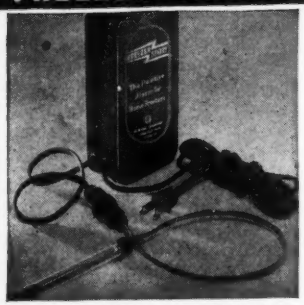

THE POSITIVE ALARM FOR ALL FROZEN FOOD CABINETS

• The simplest device you have ever seen to warn of mechanical troubles. Designed for use in any low temperature cabinet. Can be installed in two minutes by anyone.

Buzzer, battery operated. Trickle charger insures five-year battery life. Buzzer operates 100 hours. Actuated at plus 12°F by mercury contact. No thermostat to get out of order. Action is as positive as gravity.

If not available through your local locker, plant, or appliance dealer, order direct. Immediate delivery parcel post prepaid. 100% moneyback guarantee. . . **$14.95**

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1053 MAIN ST. BUFFALO 8, N. Y.

grading beans, or discovering pinholes in tin plate.

Any of these devices will control alarms, motors, heaters, lights, radios or electrically operated valves. For most any operation one wishes to control, there is usually a way to do it effortlessly with electricity.

Farm Refrigeration

Walk-in refrigerators are large size mechanically cooled boxes for general cold storage. They may be used to store milk cooled over a surface cooler. They are commonly used for aging beef. They may also be used for temporary storage of many farm products such as dressed chickens, fruits and vegetables held for a few days for better markets, produce for sale in a roadside stand. Some walk-in boxes contain tanks of brine for circulating through the surface milk cooler; some have frozen food compartments for freezing and storage of produce. Power is ¾ to 1 hp.

Freezers have been No. 1 on many lists of equipment farmers said they were going to buy after the War. They are available in sizes from 4 cu ft to any size desired. Many farmers use them in addition to storage in locker plants. Common sizes for farm use are 16 to 60 cu ft. Costs range from $200 up.

Counting interest on the investment, it costs more to operate a freezer than to rent a locker of equal capacity. Each has some advantages. The freezer advantages are in being able to save small quantities of home grown produce, in having the contents always handy for use, in being able to store cooked foods, bread, pies, cakes, ice cream and other products wanted daily.

The effectiveness of cold storage *insulating materials* depends on keeping them dry. That means they should be protected by vapor-proof seals placed outside the insulation that will exclude air and dampness from outside the box.

Thick insulation saves power and holds the cold longer in case the power is off. Some boxes built in place have 12 inches or more of insulation. That thick insulation, however, makes cabinets too wide to go through doors. Thick walled, top opening freezers are also difficult to get food into and out of. Manufacturers usually compromise on 4 to 5 inches of insulation.

Proper packaging of foods for freezing is important. Fruits and vegetables may be frozen in glass jars, or in waterproof cartons or bags. Space should be allowed for expansion in freezing. Materials for wrapping meats should be vapor proof as well as water proof, and should be sealed. Freezing unsealed meat takes out moisture and reduces the weight and quality of the product. Some cellophane is vapor-moisture proof; some is not. Aluminum foil and some other materials are satisfactory.

Cold storage of fruits and vegetables to hold for higher prices are profitable undertakings on many farms throughout the country. Vegetables are cooled and held for a few days to avoid market gluts. Peaches may be stored for several weeks; apples through the winter. It permits packing and grading after the busy picking season ends and makes orderly marketing possible. Manufacturers of refrigeration machines and insulating materials have engineering departments that assist with designs. Such storages in small and large sizes may be seen on farms in most sections of the country particularly throughout the Middlewest and Northeast. Power used runs from 3 to 20 hp.

Refrigerating machines in sizes from ¼ hp up are available from a number of manufacturers for installation in all types of refrigeration and air conditioning equipment. Installation usually requires the services of an experienced installer. Some milk cooler units are shipped assembled so they may be placed in cabinets and plugged in without a serviceman.

Evaporative coolers are widely used in the arid regions of the West and to a limited extent in other sections. High outside temperatures and dry air make evaporative cooling more effective. In general the process consists of dripping water on a pad of excelsior and drawing air through it with a fan. In evaporating the water, the air is cooled. The cooled air is then used for air conditioning houses, cooling hen houses, cooling eggs, etc. Costs are low. Temperatures cannot be lowered enough for refrigeration.

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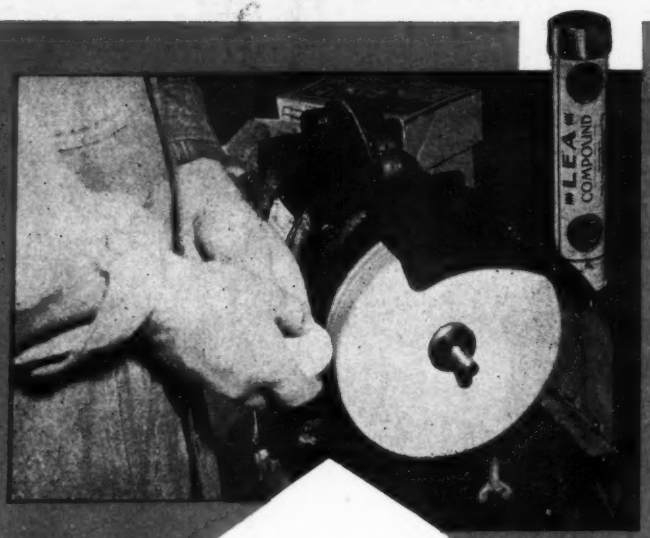

Egg Farmers sure like the cLEAnegg egg-cleaning method

What is the cLEAnegg Method? It's a simple method, consisting merely of applying the soiled egg to a revolving cotton buff coated or headed up with a special mildly abrasive Lea Compound. Touch the egg to the buff and off comes the stain!

The cLEAnegg Method is dry, clean, effective and fast. Hundreds of egg farmers are now using it. If your feed dealer cannot supply you with the cLEAnegg Kit, write us. It costs $6.15 F.O.B. Waterbury, Conn. and consists of the following items: pre-treated buff, 2 lb. bar of cLEAnegg compound, Lea humidicap, and adapter for fastening buff to shaft of a ¼ to ⅓ hp motor. One bar of cLEAnegg compound will clean hundreds of dozens of eggs. All you need is the motor.

THE LEA MANUFACTURING CO.

16 CHERRY AVENUE WATERBURY, 86, CONNECTICUT

Burring, Buffing and Polishing . . . Manufacturers and Specialists in the Development of Production Methods, Equipment and Compositions

Electricity in the Home

THE home is and probably always will be the most important place for the use of electricity on the farm. Much more is known about home equipment because of its wide sale and use.

Before You Buy
Stop—Look—Listen!

You can have confidence in your choice of electric home equipment if you:

Eliminate that which does not carry the Underwriters Laboratory Seal of Approval.

Look over the special features offered by long time established manufacturers.

Decide on the dealer who backs up a manufacturer's guarantee with service and parts.

Learn to read the identification plate. Make certain that it is correct for your highline service and house wiring.

Wait, if necessary, to get what will mean the most to your family and farm. It is false economy to be satisfied with a high pressured substitute.

Buy equipment large enough for year 'round farm use.

Read the instruction book carefully.

Remember prices quoted here are approximate and subject to change.

Air Conditioner. A room air conditioner is designed to cool a specified space but not adjoining rooms. It also removes humidity from the air, filters dust and pollen, and provides air circulation. It may be plugged into an adequate convenience outlet and installed in a window. A few models are on the market—more will be available next year.

Blender. You will find a blender a real time saver in preparing nourishing drinks, omelets, special diet and baby foods. A glass container holds the raw, canned or cooked foods which can be easily converted into fine pulp or liquid drinks. A blender will also shave ice, whip cream, and make small batters. About $35.

Blanket. An automatic electric blanket or comforter means perfect sleeping comfort, especially in an unheated room. Regardless of the outside temperature, you can always sleep relaxed in the pre-warmed bed that stays uniformly heated all night. No additional weight of other blanket is necessary. You set the control at the temperature comfortable for you, and there is no danger of overheating. Uses less than 1 kw-hr per night.

Research done on electrically heated flying suits during the war has been supplied, resulting in electric blanket improvements in both durability and safety features.

Bottle Warmer. Parents with formula fed babies do well with this convenient accessory for day and night feedings. Some warmers have extras which will allow heating of baby foods and medicated vapors for croup and colds. $4 to $10.

Casserole. A 3½ quart casserole is a miniature roaster in which you can cook and serve at the table. It's perfect for covered-dish meals, baked beans, baked potatoes, and pot roasted meats. In hot weather it is so easy to fit into buffet and porch suppers with that necessary hot dish. Features: Heat control, insulation, cool handles and base. $7 to $10.

Clock. Keeping up with family and livestock schedules is important on the farm. You can depend on constant reliable time from an electric clock. There are good looking alarm, mantel, and wall clocks of conventional size. Wall clocks with larger numbers are made for barns or machine shops. Operating cost is negligible. $5 to $20.

Clothes Drier. Come rain snow or cold, drying your wash is never a problem with an automatic drier. The clothes are tumbled in a warm air current until just the right dampness for ironing or until completely dry. A special outlet is necessary.

A kitchen ventilating fan should be installed with every drier to dissipate the humidity. A drier loaded with the damp equivalent of 8 pounds of dry clothes exhausts about one gallon of water into the air per hour. Only a few models are available this year. Around $225.

Coffee Maker. You have a wide variety of choices in both metal and all glass coffee makers. Glass is easily cleaned, but must be handled carefully. In hard water areas, it is considered preferable for a good brew. Metal is more practical, and apt to be longer lived. Choose a model which is easy to keep clean. The manufacturer's own heater unit is more efficient than using a coffee maker on your range.

Corn Popper. Your house can frequently have that tantalizing popped corn aroma with a plug-in corn popper. There are some that require no stirring or shaking and through a glass cover you can watch the kernels pop. A crowd is easily entertained and quickly fed with a popper of 2 quart capacity. $4 to $10.

Door Chimes. One more way to encourage farm visitors to use

Cooks on the Double Quick...so clean, so reliable, too!

The New Westinghouse Electric Ranges are so easy to use, so fast, so sure in their uniform cooking results. They take the guesswork . . . and the *hard* work . . . out of cooking. They're safe, too . . . no open flame. And above all, so *clean* . . . no blackened pots and pans, no ashes to remove. No coal or wood to carry. New, Speedy Corox Surface Units bring things to a boil in surprisingly short order. The giant oven holds a complete meal for a family of eight. High-speed broiler is waist-high—there's no stooping. The new, fast Deep-Well Cooker *now* deep-fries, steams, boils. Also does most types of surface cooking. See them, and many other electric appliances, at your Westinghouse retailer's now.

Every house needs Westinghouse

Maker of 30 MILLION Electric Home Appliances

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your main entrance is to have door chimes. They'll save you many steps because you can hear them anywhere in the house. Have them at both entrances—one note for the rear, and two notes for the front door. Chimes are easy to install and service. You can have a choice of color, size, metal, and tone which best fits into your home. $6 to $20.

Dishwasher. For the farm family who wants to save time, increase kitchen sanitation and reduce dish breakage, investigate a dishwasher. A family of five will wash six tons of dishes a year. Dishes washed by hand contain ¼ more live bacteria than when done in a dishwasher. Dishwashing and drying is all done automatically. The small amount of water used is hotter than the hand can

stand. A dishwasher requires careful installation and plumbing. An automatic water heater is necessary. A water softener is desirable with hard water.

Egg Cooker. With an egg cooker it is easy to work out an exact egg timing schedule to your family's liking. You can put it on the table for the folks to help themselves. It is a certain way of having a tender egg because there is no chance for eggs to cook in excessive heat. $5.

Fan. A portable fan can be useful the year 'round. It is a relaxer for hot humid days. At night it will draw in cool air and replace the hot daytime air. In cold weather, a fan will distribute stove heat around the room where you need it. It will hasten the indoor drying of clothes.

Features: Oscillating action, adjustable fan head from 6 to 24 inch diam, fan more than one speed, on and off switch, heavy padded base for table, floor or wall use. $10 to $50.

Kitchen Ventilator Fan. Kitchen remodeling calls for improved ventilation which can be easily achieved with a ventilator fan. Excess steam, cooking odors, greasy vapors, and heat can be quickly pulled out of the room. This means less cleaning of windows and walls. It also means a less humid room in which to work and eat.

Features: Easy to clean guard and fan blades, cold and rain protector, convenient switch. $15 to $30.

Freezer. A freezer will save you trips to town, simplify your food preparation, and give you the best quality food when and where you want it.

Allow 5 to 6 cubic feet of storage space per person. Select a cabinet convenient for your height and reach, for your family and for placement in your house.

Besides freezing meats, poultry, fruits, vegetables, it also preserves baked and cooked foods.

Features: Top door with counterbalanced lid on chest type or front opening door on upright cabinet. Automatic light, removable baskets and bins, special shelves to increase freezing area, ice cube trays. Thermostatic control to maintain your designated temperature. Light warns or alarm signals you in case of current interruption. Some cabinets have compartments for both storage and fast freeze. $390 for 18 cu. ft. freezer to $985 for 30 cu ft.

Freezer Lockers containing 25 to 40 lockers and a chill room have been built on a few farms. They serve the farmer and a few close neighbors. Locker rentals pay the cost and operating expenses. Cost around $1800. A possibility for a supplemental farm industry.

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WILSON
"ZEROSAFE"
FREEZER

Wilson "ZEROSAFE" Freezer takes the guesswork out of freezing.

Now you can have the best of food, more food, a greater variety of truly fresh vitality-packed food, right in your own home, instantly available for each day's use the year around. . . .

Now you can join the thousands of others the country over who have for years enjoyed the healthful pleasure of better living with Wilson "ZEROSAFE" Reach-In Freezer. . . .

You too can freeze and store, with little effort and at modest cost, all of the garden-fresh vegetables, tree-ripened fruit and health-giving meats, seafood, and poultry that your family and your guests can eat in a whole year of better living.

WILSON "ZEROSAFE"

Model FF-25 (illustrated) will hold 875 lbs. of food at the conservative average of 35 lbs. per cu. ft. Other models from 15 cu. ft. to 120 cu. ft.

VALUABLE GUIDE FREE

Send your name and address today to Dept. EF-1 for your free copy of the "Wilson Farm Freezer GUIDE to Better Living", an invaluable booklet on the production of super-quality home-frozen foods.

WILSON REFRIGERATION, INC. SMYRNA, DELAWARE

Garbage Disposer. The disposal of food wastes is quite a nuisance problem, particularly on farms where stock is fed by formula.

A self-cleaning and odorless garbage disposer unit may be mounted under a sink or purchased with a completely assembled electric sink. It shreds foods fine enough so that they easily flush through the sink drain. This ground garbage can be disposed of through a septic tank of adequate size.

Grill. A grill saves time and waiting at the table. It is ideal for limited service of toasted sandwiches, toast, griddle cakes, fried eggs and grilled meats.

Features: Automatic heat control, drain spout with grease cup, overflow batter ring, extra set of grids for waffles, warming pan, and expanding hinge, folding back top which provides additional frying surface. $8.50 to $15.

Heater. A portable heater is useful all around the house many times during the year. The radiant type heater sends a beam of heat for spot warming. It is not designed to heat rooms but keeps room chilliness away from your body.

More expensive heaters have a fan back of the heating coils to force the heated air out into the room. The radiator type with temperature controls supplies heat like a hot water radiator. Heaters should be plugged into convenience outlets—not into lamp sockets or extension cords. Wattage 660 and up; cost $5 up. See also page 32.

Heating Pad. A heating pad replaces the hot water bottle for any application to everyday body aches, pains, chills and cold feet. It is best used under doctor's directions for bed patients.

Features: Removable cover for washing, separate non-radio interfering circuit, thermostats to prevent overheating, selected heats with easy to regulate switch. $5 to $10.

NEVER BEFORE AN
Electric Range
LIKE THIS!
IT'S THE ONLY SPACE SAVER RANGE WITH AUTOMATIC OVEN CONTROL, DEEP WELL COOKER AND LAMP
★
For the first time these deluxe features are available in a range specially designed for the small kitchen. Place a whole meal in the oven, set the control clock, then go shopping—return to a delicious dinner. Cook a complete meal economically in the Vita-Miser deep well cooker. There's full range-top illumination too, plus cooking capacity equal to high priced ranges . . . See it today.
Electromaster Inc.
MOUNT CLEMENS, MICHIGAN
THE ELECTRIC RANGE THAT'S "FIT FOR A QUEEN"—ON THE "QUEEN FOR A DAY" PROGRAM—MUTUAL NETWORK

Hot Plate. A hot plate does not give you the speed and lower cost that you get from electric range cooking. It does provide cool, clean cooking in places where an electric range is not available.

It is best to have standard range type units with three heats controlled by heavy duty switches. A special purpose outlet should be provided for a hot plate. $8 to $42.50 for single or double hot plates. Avoid very cheap hotplates without Underwriter's Laboratory approval.

Moist Heat Pads have recently been placed on the market. One is a small sinus or joint pad costing $4.95. Another of standard size at $9.95. They have water reservoirs for ten hours moisture supply.

Ice Cream Freezer. With an ice cream freezer you can quickly turn surplus cream into a frozen dessert for immediate consumption or for locker storage. Managing the freezer is a chore that your younger family members will take to quite willingly. Features: Non-warping tub, heavy tinned cream can, self-adjusting wood bar scrapers, enclosed motor and gear drive assembly. $25.

Iron. A new streamlined iron will save you hours of time, current, and best of all your energy. Care for it properly and it will serve a generation. Each manufacturer personalizes his automatic iron with special features so compare them to know which are most important to you.

First, grip the handle. Be sure it fits your hand to form a natural rest for your thumb and the heel of your hand.

The new lighter weight irons save a third of your energy and actually use about 40% less electricity. Heat is more important than weight and pressure. These automatic irons are 1000 watts or more and should be used on a convenience outlet. They are priced from $10 to $13.

Look for an easy turning dial; good balanced rest position for iron, sole plate that meets your needs; durable cord that comes out of the iron at an angle that doesn't interfere with the way you iron. If you're left handed you may choose a cord that comes up and out at the end, or at the left side, or with a swivel-ball connection to swing it from left to right.

A steam iron is just the ticket to get a professional press on trousers, suits, and other garments when you want a tailored finish. But it may also be used as a dry iron for cottons, linens and flatwork. $17 to $22.

Ironer. You can be as adept and efficient with an ironer as with a hand iron. It can do most of your work and cost about the same to operate as the modern automatic hand iron. A flat-press ironer costs about $230, and a rotary around

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YOUR RUNNING WATER
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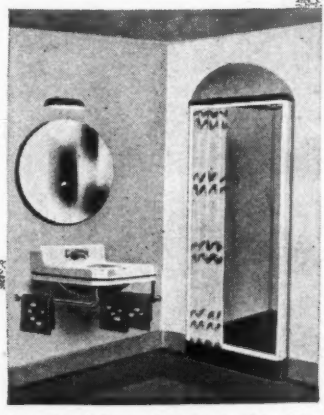
SHOWER BATHING
Refreshing • Relaxing, Economical



- Attractive modern cabinet design
- Fits any 3-foot area
- No extra floor or wall preparation required
- Uses less hot water
- Makes modern bathroom out of waste space in hallway, bedroom or closet

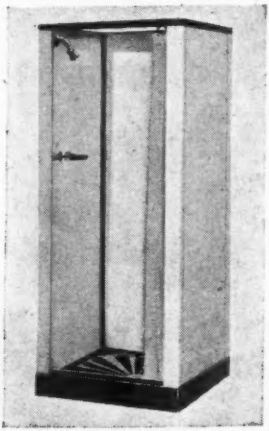
Suggested Bathroom layout with Bathe-Rite Model 2 All-Steel Cabinet.

TWO Models to Choose From

For the Bathroom — Bathe-Rite Model 2 — "Lifetime" Steel walls of durable white porcelain-like finish, and porcelain enameled steel floor with patented slip-proof surface.

For Basement, Barn, Attic, Utility Room — Bathe-Rite Model 5690P — Low cost, with durable white Ligno-Cellulose Plastic walls, and porcelain enameled steel slip-proof floor.

Prices, material, and installation available from your plumber.



Popular-Priced Bathe-Rite Model 5690P. Plastic walls with porcelain enameled base.

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BATHE-RITE DIVISION
804-S South 72nd Street, Milwaukee 12, Wisconsin
Our 53rd Year of Quality Manufacturing

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to .....
Address .....

$125 to $200, or a portable about $45 to $80.

A flat metal shoe has an ironing surface of about 12 hand irons with 400 pounds pressure.

The roll of a rotary ironer is usually 26 inches wide and 6 inches through. Some rolls are 22 to 30 inches. A wider roll saves turning and adjusting materials.

A table model is most convenient. Sit down on a chair with a back support—not a stool, and operate the controls. Can you reach easily and sit comfortably with your feet on the floor? That's an important shopping test.

Features: Open usable ends, speed control, right to left shoe action, to and fro rocking roll, slender roll for sleeves and pant legs, hand guard to prevent fingers contacting shoe when inserting material, lap guard to keep damp garments off your knees and for folding, extra thermostat to reduce heat on unused end of roll, a shoe that turns upright for steaming, sponging and cleaning, pilot light, automatic current cut off when ironer is closed, easily changed ironer cover, lock-stop casters to prevent ironer creeping.

Mixer. An electric mixer with powerful motor and a variety of speeds can save you much time and energy every day if you keep it connected for ready use. It mixes, beats, whips, and juices. With special attachments it can shred, slice, shell, peel, puree or grind foods, also churn butter and freezes ice cream. $30 to $75.

Range. If your farm is completely electrified you'll have the advantage of the lowest rate when you cook with electricity. It also reduces the operating cost of any other appliances you add.

Today's electric range is fast, clean, cool, economical, and so dependable. It requires no flue connection, wood chopping or

Illustrated: Heavy Duty Combination Portable and Suspension Type Electromode Unit Heater.

ENJOY THE SAFEST KIND OF HEAT!

with ELECTROMODE All-Electric Heaters

Electromode heaters are the safest for the electrified farm. They may be used in barns, workshops, poultry houses, milk houses—wherever 115 or 230-volt outlets are located. All Electromodes have the Safety-Grid—the patented cast-aluminum heating element that eliminates all exposed hot or glowing wires—and all danger of fire, shock or burn. Safe to use around hay or other inflammable materials when properly installed. Electromodes may be operated manually for portable use or with thermostats for automatic temperature control in permanent locations.

There are other Electromodes—Portables and Bilt-in-Wall types—for home heating, too. See your electrical appliance dealer, contractor or farm equipment supplier for sizes and models to meet your needs or write Electromode Corporation for further information. Electromodes are approved by Underwriters' Laboratories.

ELECTROMODE CORPORATION, 45 CROUCH ST., ROCHESTER 3, N. Y.

If you'd like literature on Electromode All-Electric Heating Equipment for farm or home use, write Dept. EF-87.

ELECTROMODE *All-Electric* HEATERS

World's Leading Exclusive Manufacturer of All-Electric Heaters

frost-proof **HYDRANT**

HANDY WATER for STOCK and FIRE PROTECTION

Galvanized iron top body and standpipe, brass lower body and working parts, lead waste included. Inlet connection for ¾" iron pipe, outlet for ¾" hose coupling. Order sizes to depth of frost where installed. For 3-ft. burial, order 5-ft. size.

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IXL AIR CUSHIONED ELIMINATOR

Price $3.25 Plus shipping charges.

If you have a water-hammer condition, install this eliminator before damage is done. Bottom tapped ½" iron pipe size for hot or cold water lines.

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5 ft. $9.50
6 ft. 10.50
7 ft. 11.50

F.O.B. Phila., Pa.

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to install a **CROWN PUSH-BUTTON BARN CLEANER!**

NOW, while your cows are out to pasture, is the time to put in your CROWN Electric Barn Cleaner. And, you'll be glad you did . . . 365 times a year, as your daily barn cleaning chores are done for you *automatically*. You just push a button . . . in a matter of minutes your barn is completely clean, and *all* manure, including valuable nutritive liquids, is loaded directly into your spreader.

To save time and money *tomorrow*, see your CROWN Dealer or write for full details *today!*

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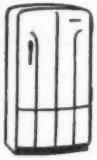
THE NATIONAL IDEAL COMPANY
Dept. EF Toledo 4, Ohio

refueling. Self cleaning units are of flat heating tubes or open coils in a ceramic tile plate.

Combination coal-wood and electric ranges provide winter heating and controlled cooking. These combination ranges may also be equipped with different types of oil burners in place of the coal or wood grates.

Features are large bake ovens and broilers with adjustable racks. Some have a built-in roaster, cake griddle, saucepan, deep well cooker or pressure sauce pan. Extra conveniences are an outlet for small appliances, a clock, minute minder, light, storage space, and warming compartment. Standard and deluxe models $145-$320.

Refrigerator. Refrigerators offer a choice of useful features: Two-temperature models with



more space for temporary frozen food storage, small freezing compartment to hasten cooling of packaged foods being prepared for the town locker, and to store already frozen foods; moist section for storing foods uncovered; automatic defrosting; deep adjustable shelves for a milk can, bottles, poultry, ham; a butter container keeps butter at spreading consistency; an ice cube tray releases one cube at a time to avoid melting entire tray. 6 to 9 cubic foot sizes $165 to $360.

A family of two needs at least a 6-cubic foot refrigerator, and an extra cubic foot should be figured for each two additional persons in the family. When choosing a refrigerator, keep in mind the side on which the door opens, to make certain it will be convenient with your kitchen arrangement.

ADEQUATE WIRING
KEY TO SATISFACTORY RURAL SERVICE
SERVES AND SAVES

Roaster. An electric roaster with automatic heat control is never a kitchen range substitute. It does provide extra facilities for roasting, baking, cooking and canning.

No special wiring is necessary for its 1320 watts. It may be plugged into appliance outlets but never into lamp sockets. You can take it along to church suppers, township meetings, and school lunch rooms where there is a convenience outlet. Insulated it costs about the same as a range oven to operate.

Special features are lifting and baking racks, inset cooking utensils, broiler and grid attachment, vapor seal cover with adjustable vent, signal light, and timer. $30 to $50. Some roasters have been equipped with a special stand having storage space beneath.

Sewing Machine Motors. Electric motors with variable speed controls are made for converting foot power sewing machines to electric power. The motor is mounted on the machine head and drives the fly-wheel either by friction or by means of a short belt.

Sewing Machine. When you invest in a sewing machine, remember that many machines are now being used by second and third generations. Portable machines are popular, but a cabinet machine is more convenient than a portable which must be brought out and set up on a firm table each time you use it. A cabinet machine is stable and makes an attractive piece of furniture when closed. Modern sewing machines are quiet and practically vibrationless, even at high speed.

Shaver. An electric shaver is really a greater boon to a farmer than to a city man. After washing the face the dry shaver may be used before any mirror and before the washbowl for others to use. Hot water is not necessary.

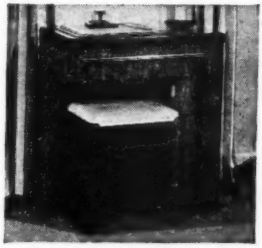
What farm wives say about their SINGERS!

"I didn't know a machine could run so smoothly—stitch so easily—until I got my new Singer! Now I see why women everywhere rate Singers first."

"My Singer sews like a charm—and it *looks* like a charming piece of furniture. I'm delighted, too, because it serves double duty as a sewing machine and an attractive desk."

"My husband has learned from experience that the best piece of machinery is the best buy. It's true with tractors. It's true with sewing machines. That's why *I* chose a Singer!"

"I have to have a machine that will stand up under long use, because I'm always sewing for my family and my home. I couldn't ask for anything more dependable, more trouble-free than my Singer!"



For your protection, remember, Singer Sewing Machines are sold *only* through Singer Sewing Centers. Write for the address of *your* nearest Singer Sewing Center today!

SINGER SEWING MACHINE COMPANY

149 Broadway, New York 6, N. Y.

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WITH UNITED — JET PILOT SYSTEMS

Insures bumper crops, higher milk production, greater poultry output. Makes household duties easier and faster. Allows more leisure time. Write for free booklet today.

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Enter our 2 line 20 word or less rough joke jingle contest about our water systems.

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Have plenty of hot water at all times — for only a few cents a day. Always full — can't run dry. 10-gallon heavy gauge copper tank is permanent. Quick-heating 500-watt element, automatically controlled . . . nothing to forget. Thick insulation holds in heat. Splash-proof bowl at easy height for pouring. Write for information.

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564 Nebraska St. Oshkosh, Wis.

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FORDS
"AIRLINER"

You can't afford to milk by hand when you can have a FORDS Milker at such a low cost. Four to five times faster than hand milking—easier!

The FORDS is simple to install—no pipelines. Guaranteed highest quality. Lifetime solid nickel-silver valve chamber. Smooth ball bearing motor drive runs in oil. Safe, dependable action cannot get out of adjustment. Milker can be thoroughly cleaned in 3 to 5 minutes. Made to last 15 to 20 years with normal care. Many of our first models are still in operation. Thousands in use.

Portable "JEEP", Milks anywhere! Electric or gasoline motor.

WRITE for folder and low prices.

MYERS-SHERMAN CO.
1306 12th St.
Streator Illinois

MILK the EASY Way...with a FORDS!

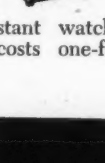
The electric shaver cannot cut the skin and invite infection and ingrown hairs. The high first cost of a good shaver—$15 to $21.50—is offset by the low upkeep as compared with the $10 estimated yearly cost for razor shaves including blades, soap, and lotions. Current consumption is negligible.

Tea Kettle. A 3 quart electric tea kettle costs a little more than a regular tea kettle. It won't burn out when it runs dry because it has a safety device which cuts off the current. It speeds up cooking jobs, heats the baby's bottle, and some can be used as the lower part of a double boiler. To be available soon.

Timer. A timer can be a step and memory saver. There are occasional clocks and kitchen wall clocks which have a combination appliance timer. This is so convenient for turning on radio programs, starting the coffee maker or the bottle warmer.

Vacuum Cleaner. A vacuum cleaner simplifies keeping your house clean. So easy to use frequently, it extends the life and color of rugs and fabrics for less than the cost of 2 kilowatt hours of electricity per month. Available attachments are dusting brush, crevice tube, floor and wall brush, demother, sprayer, upholstery tool, floor waxer and polisher, and drapery nozzle. Tank and upright models from $50 to $100.

Toaster. Gone are the days of burnt toast and wasted bread. With an automatic toaster everyone can make his own toast without waiting to be served, and without constant watching. Toaster toast costs one-fourth as much as making toast in the electric range, unless you make a quantity. A good toaster has a well-insulated base, heat-proof handles, non-tarnishable finish, quiet operation. Some have a control to regulate the brownness of the toast and another to make it crisp or soft. Some pop up the toast or hold it in the toaster at reduced heat to keep it warm.



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RUNNING WATER at LOWEST COST

with an APCO *Master-Line* WATER SYSTEM (SHALLOW WELL)

WRITE for BULLETIN 112-A

You make an investment in better living and greater farm profits when you install an APCO Master-Line Unit. Operating at slow speed (1750 R.P.M.) and with only one moving part in the pump, you are set for many years of superb water service—enough for EVERY farm need including FIRE PROTECTION. 325 G.P.M. (others up to 3000 G.P.H.) Silent operation. Instant response. Life-Time replaceable pump covers. SATISFACTION GUARANTEED.

We Also Make Deep Well Pumps

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88 Loucks St., AURORA, ILLINOIS

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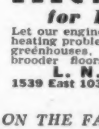
MODEL 65—Operates off 110 AC 60 Cycle or 6 Volt Dry or Storage Battery. Price $9.95 and up.

Famous HOL-DEM electric fence controllers can be shipped from stock. Fastest selling controller on the market. All types for all purposes. Low cost. Self-contained.



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ELECTRIC SERVICE SYSTEMS, INC.
1330 Quincy N.E., Minneapolis 13, Minn.

ELECTRIC HEATER
for Every Farm Use

Let our engineering department help solve your heating problems with heating cable for hotbeds, greenhouses, pipe protection, water troughs, brooder floors, and that hard-to-heat room.

L. N. ROBERSON CO.
1539 East 103rd Street, Seattle 55, Washington

Vaporizer. For colds and croup, medicated steam can be had quickly and easily from an electric vaporizer. Steam is so directed to allow your patient to inhale comfortably in bed or sitting up. Convenient features are timing gauge, with automatic shut off and thermostat. $3.50 to $10.

Waffle Baker. A waffle baker is most welcome in a family that likes hot breads, especially pancakes. It comes to the table with the cook so that everybody can sit down, eat together, and help with the cooking. A waffle baker saves time and adds variety to your family and company menus.

Features: Automatic control, indicator light or dial, broad base or trough to catch overflow batter, expansion hinges to prevent soggy waffles, pre-treated grids, cool base to protect table top, easy to grip cool handles. $7.50 to $24.

Washer. Conventional type or automatic? That's the question today's buyer asks.

An automatic washer requires plenty of hot and cold softened water under pressure, and special plumbing. It does everything: soaks, washes, rinses, spin-dries, and shuts off, all automatically, in 45 minutes or less. Approximate price range, $230 to $310; Semi-automatics $175. $330 for one which converts to a dishwasher with an extra tub.

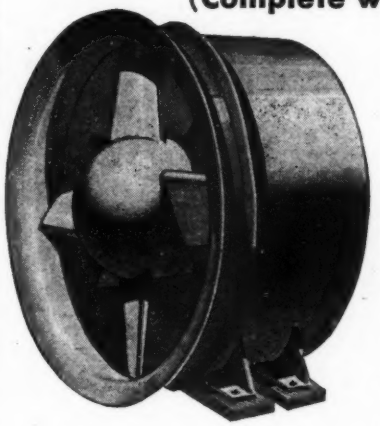
A conventional washer is a great chore saver. You may have easy-to-use safety wringers; drain boards which automatically tilt either way with wringer use; two washing speeds; bell timer; drain pump with hose connection to save carrying used water; a spin-dry basket instead of a wringer. $90 to $160.

Water Heater. Hot water cuts down the time and the energy

Immediate Delivery

HAY DRYING FANS

(Complete with Motor)



Ready and waiting on the floor of our warehouse for shipment to you are these exceptionally efficient units . . . designed especially for hay drying systems. They're quiet, low horsepower fans that may be moved and used for ventilating or exhausting purposes elsewhere in the barn when haying time is over.

Barn-curing hay offers many advantages to you. You'll eliminate hazards of weather, get more hay per storage unit and have higher feed values in hay that will test better than the field-cured product.

Manufactured by America's pioneer producer of Vaneaxial Flow Fans.

Dealers: Territories are still open for allocation. We'll be glad to hear from you.

Write today for prices and a detailed bulletin that shows you how to build an economical hay drying system in your mow.

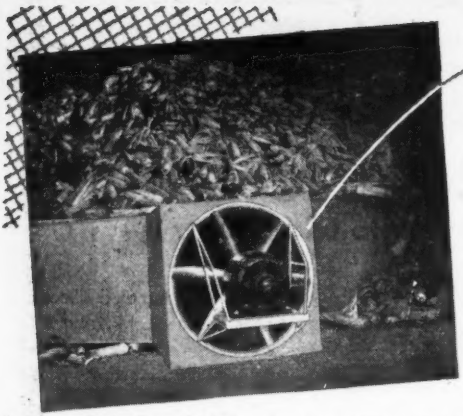
La-Del Division
JOY MANUFACTURING COMPANY
General Offices: Henry W. Oliver Bldg., Pittsburgh, Pa.

LOOK!..an OVEN CONTROL
ON A COMBINATION COAL-WOOD RANGE!

When you keep a coal fire for kitchen comfort, the oven is heated in the usual manner. But if the fire is not hot enough for baking, you turn on the electric oven unit to raise the temperature. The automatic control is then in full charge. You'll never have a baking failure. Cooking top is also half coal-wood, half electricity. See your Monarch dealer, or write.

MALLEABLE IRON RANGE CO., 147 Lake St., Beaver Dam, Wis.

Monarch "duo-oven"
COMBINATION COAL-WOOD-ELECTRIC RANGE



HARTZELL fan-dried grains pay off!

Install a Hartzell grain-drying fan in your barn *now* and realize bigger profits this *fall*. Weather risk and loss caused by over-ripe harvesting of corn and other grains have been eliminated by Hartzell fan owners. They harvest small grain with high moisture content before the straw is over-ripe. They get corn in from the field before time for seeding. They dry it with a Hartzell fan and get grain which won't mold — will test high with richer feed value. Get in line for bigger profits with a Hartzell grain drying fan.

SEE YOUR HARTZELL REPRESENTATIVE TODAY

HARTZELL PROPELLER FAN CO.

PIQUA — DIV. OF CASTLE HILLS CORP. — OHIO

SAVES WORK—SAVES MONEY—GIVES FRESH FEED

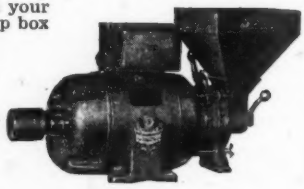
WOOD'S DIRECT DRIVE Electric FEED GRINDER

• One of the greatest work savers for any electrically equipped farm. Installed in your barn under the grain bin—over the chop box—grinds your feed automatically while you do other chores. Saves all the work and time of taking grain to the mill to be chopped—cuts 90% off your chopping costs, and with a Wood's Grinder you can make a further saving by buying your feed grain by the carload—either by yourself or by joining with your neighbors.

Gives Stock Fresh Feed Daily

Avoids oil rancidity and loss of food value which occur in stale chop. Stock like fresh feed better and thrive on it—you can give it to them fresh daily with a Wood's Grinder. This grinder is now available in United States after 17 successful years tried performance on thousands of Canadian farms. DIRECT DRIVE means no belts to slip or wear out—no loss of power. ADJUSTABLE GRIND for all types of feed. Heavy-duty motor can be used to operate other equipment. Find out now about this proven direct-drive grinder.

Write for catalog and information



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Attractive territories available for this big demand line. Write us now.

WOOD'S OAT ROLLER

NEW Electric Drive—low-cost, foolproof. Rolls feed for only ½c to 1c per 100 lbs. Also standard model for flat belt drive, gas engine, etc. Write for catalog.

THE WOOD'S LINE

MILKERS—MILK COOLERS—FEED GRINDERS—OAT ROLLERS—ELECTRIC FENCERS—FARM FREEZERS—WATER HEATERS—WATER SYSTEMS—FARM VENTILATORS

WOOD'S Electric FARM EQUIPMENT

THE W. C. WOOD CO. LIMITED

HEAD OFFICE AND FACTORY • GUELPH, CANADA

you spend in routine cleaning. Modern living requires hot water for 100 uses and cold water for only 10.

You can choose a round or square tank tall or table height water heater with 30 to 80 gallons capacity. The heating unit has an automatic thermostat and safety devices. The heater requires no venting, so can be installed anywhere as close as possible to sinks and tubs. This avoids wasted hot water in long pipe runs. Thick insulation on the tank also holds the heat.

A family will average about 1500 gallons of 145° hot water a month. Prices $95-$225. See also water heating.

Household Appliances Approximate Wattage and Electricity Used per Year

Appliance	Ave Watts	Est Kw-hrs Year
Bottle warmer	450	10
Blanket	215	150
Clothes Dryer	2500	250
Clock	2	17
Cocker (fireless)	650	75
Cooker (egg)	600	15
Corn Popper	600	5
Curling Iron	20	5
Dish Washer, Disposal	350	60
Fan (desk)	75	20
Fan (ventilating)	40	25
Grill	600	25
Hair Dryer	100	5
Heater (radiant)	850	70
Heating Pad	50	3
Freezer Cabinets	350	1000
Hot Plate	1000	70
Iron	850	100
Ironing Machine	1400	130
Mixer (kitchen)	50	5
Oil Burner	250	350
Percolator	450	60
Range	7500	1300
Radio	100	100
Refrigerator	200	400
Room Cooler	600	1000
Roaster	1320	300
Sewing Machine	75	10
Shaver	10	2
Stokers	250	275
Sun Lamp S4	125	20
Toaster	800	30
Vacuum Cleaner	200	20
Waffle Iron	800	16
Washing Machine	190	40
Water Heater	3000	3200

Estimated Electricity Used by Farm Equipment

Operation	*Power*	*Kilowatt-Hours Used*
Barn cleaning	¾ to 4 hp	Ave 100 per yr
Barn ventilation	¼ hp	150 per mo. 60 cows
Brooding	660 w	½ per chick raised
Churning	1/20 to ¼ hp	1 per 100 lbs
Corn shelling	¼ to 5 hp	7 per 100 bu
Cream separating	¼ hp	½ per 1000 lbs
Elevating grain	¾ to 5 hp	3 per 1000 bu
Feed grinding	1 to 5 hp	1 per 100 lbs
Grain cleaning	¾ hp	1 per 100 bu
Hay finishing	1 to 10 hp	50 per ton
Hay hoisting	1 to 5 hp	½ per ton
Hotbed heating	200 w/sash	1 per day per sash
Milk cooling	¼ to ½ hp	1 per 10 gal
Milking	¾ to 3 hp	20/10cows/mo
Motors		1 per hp-hr
Sheep shearing	1/20 to ¼ hp	1½ per 100 sheep
Shop equipment	1 to 5 kw	2 per mo
Silo filling	3 to 10 hp	1 per ton
Sterilizing utensils	2 to 5 kw	6/25 cows/day
Water heating	½ to 3 kw	1 per 4 gal
Water supply	¾ to 1 hp	20 per mo
Wood sawing	2 to 5 hp	2 per cord

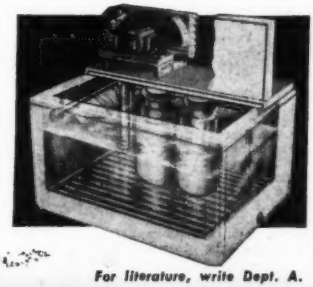
WANT BETTER MILK . . .
BIGGER MILK CHECKS?

When cool with arctic jet

Gives you "Can-top" Cooling to eliminate the "warm spot." Keeps bacteria down. (And milk checks up!)

ives you quick cooling to be-
w 50° F. average in one hour.
eps electricity bills down!
owest cost per can daily.)

Gives you easy cleaning, thanks to unobstructed walls. Keeps labor cost down! (Easily kept clean, too.)



For literature, write Dept. A.

THE SARGENT-ROUNDY CORP.
Randolph, Vermont

arctic jet

VOGEL PRODUCTS
For Farm Use

★ ★ ★

Running Water All Year 'Round With Vogel Frost-Proof Hydrants

★ Will never freeze when properly installed

★ Reduces fire hazard

★ Over a Million Vogel Frost-Proof Closets and Hydrants have been sold.

Farmers like the Vogel Hydrant because it never fools them. When they see the handle in an upright position they know the water is surely shut off. Any hydrant that does not positively close, may waste water in summer, and is sure to freeze up in winter.

★ ★ ★

VOGEL NO. 4
Frost-Proof Closet

A sturdy dependable frost-proof closet, ideal for farm use. Has heavy brass valves, hardwood seat, twelve gauge steel tank with white enamel finish and a vitreous china bowl so constructed that it will not freeze even at sub-zero temperatures.

JOSEPH A. VOGEL CO.
Wilmington 99, Delaware

Please send full information regarding Frost-Proof Closets and Hydrants.

Name.....
Address.....
Town.....County.....State.....
Frost-Proof Hydrants.....
Frost-Proof Closets.....

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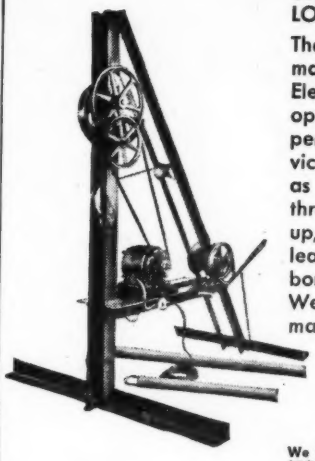

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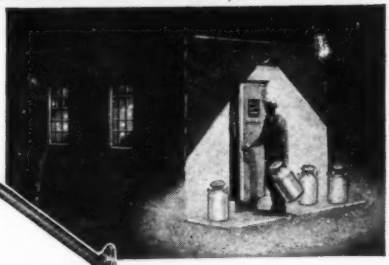

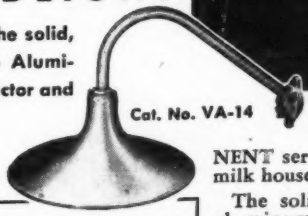

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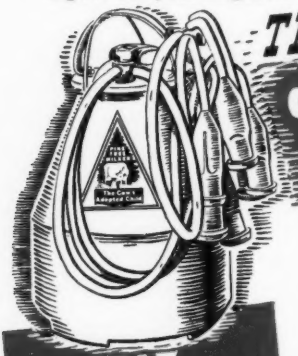

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